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DEFENDING A NATION: SYNTHESIZING GEOGRAPHIC INFORMATION
SYSTEM ANALYSIS AND GROUND PENETRATING RADAR
TO LOCATE BATTLEFIELD FEATURES ASSOCIATED
WITH THE 1780 SIEGE OF CHARLESTON

A Thesis
Presented to
the Graduate School of
Clemson University

In Partial Fulfillment
of the Requirements for the Degree
Master of Science
Historic Preservation

by
Lisa Marie Gardiner
May 2021

Accepted by:
Dr. Jon B. Marcoux, Committee Chair
Craig Bennett
James Ward
Carl Borick

ABSTRACT

Common methods used to locate battlefield features have not been utilized extensively on the Charleston peninsula. This thesis explores methods used to locate battlefield features and their effectiveness on the Charleston peninsula. The methods were utilized in areas related to the Siege of Charleston in 1780 during the American Revolution. These methods include research into historic accounts of battlefield features, geographic information systems (GIS) to georeference historic maps of the Charleston peninsula, LiDAR to detect the topography of the land and locate any changes to the land over time, and finally ground penetrating radar (GPR) to locate any battlefield features. Through this study you will see that all these methods work together well to locate battlefield features. The final method, GPR, located the remains of the earthwork fortification in Wragg Square, the tabby hornwork in Marion Square, and the foundation of the Cistern Yard barracks on the College of Charleston campus. These combined methods located areas related to the Siege of Charleston that had not been mapped.

DEDICATION

To my family, especially my mom and Louis, who have always believed in me and to my little brother Kevin Gardiner, who would have loved this.

ACKNOWLEDGMENTS

First and foremost, I would like to thank my thesis committee for joining me on this journey and guiding me. To Jon Marcoux, thank you for believing in me from day one, for always having an encouraging word and answering all my questions through e-mail, and for all the time you took to answer my questions when I stopped by your office. Also, thank you for teaching me the ways of the GPR; you are a great teacher and professor. To Carl Borick, thank you for everything; this thesis would not be possible without your years of research into the siege. To Craig Bennett, thank you for your knowledge and encouragement. To James Ward, thank you for joining me to visit Charlestonians who may have had remnants of the siege in their backyards. Also, to Nic Butler, thank you for all your advice and for the historic research materials you provided. I also want to thank Grant Gilmore and Harlan Greene for the materials you provided on the Cistern Yard. Thank you to Martha Zierden and the Charleston Museum for the photographs and prior archaeology reports. Also, thank you so much to all the archivists who provided the research materials possible to complete this thesis: our librarian at the Cigar Factory, Ms. Ina Bootle; Historic Charleston Foundation's Karen Emmons; and Robert McIntyer at the Charleston County Register of Deeds. And thank you to Molly Silliman at the South Carolina Historical Society and Natalie Adams Pope of New South Associates for your archaeology report on the hornwork. Finally, thank you to my mom for always believing in me and my husband Louis, who shares my love for history and preservation, and whose sacrificial love for me provided me the ability to complete this thesis. Finally, *Toda la Gloria sea para Dios!*

TABLE OF CONTENTS

	Page
TITLE PAGE	i
ABSTRACT.....	ii
DEDICATION.....	iii
ACKNOWLEDGMENTS	iv
LIST OF FIGURES	vii
CHAPTER	
I. CHAPTER ONE: INTRODUCTION.....	1
The History of the Siege of Charles Town-1780	8
II. CHAPTER TWO: A REVIEW OF BATTLEFIELD LITERATURE	27
Historic Accounts to Locate Battlefield Features in Europe and America	28
GIS to Georeference Historic Maps in Europe and America	31
LiDAR used to Locate Battlefield Features In Europe and America	33
GPR Surveys used to Locate Battlefield Features In Europe and America	33
Conclusion	40
III. CHAPTER THREE: METHODOLOGY	43
Collection of Revolutionary War Maps, Plats, and Historic Accounts	44
Collection of Post-Revolutionary War Historic Maps And Plats of the Study Areas	50
LiDAR Data Collection	51
GPR Data Collection.....	53

Conclusion	57
IV. CHAPTER FOUR: DATA ANALYSIS.....	58
Hampstead Hill Historic Accounts	58
Hampstead Hill Historic Maps and GIS	60
Hampstead Hill LiDAR Results.....	70
Hampstead Hill Cigar Factory Parking Lot	
GPR Survey Results.....	74
Hampstead Hill Trident Tech Parking Lot	
GPR Survey Results.....	78
Wragg Mall Historic Accounts	82
Wragg Mall Historic Maps and GIS	82
Wragg Mall LiDAR Results	90
Ground Penetrating Radar Results in Wragg Mall	94
Wragg Square Historic Accounts.....	98
Wragg Square Historic Maps and GIS.....	98
Wragg Square LiDAR Results.....	107
Ground Penetrating Radar Results in Wragg Square.....	111
Archaeological Excavations in Wragg Square	117
Marion Square Historic Accounts.....	120
Marion Square Historic Maps and GIS.....	121
Marion Square LiDAR Results.....	130
Ground Penetrating Radar Results in Marion Square.....	134
Cistern Yard Historic Accounts	140
Cistern Yard Historic Maps and GIS	142
Cistern Yard LiDAR Results	149
Ground Penetrating Radar Results in the Cistern Yard	153
V. CHAPTER FIVE: CONCLUSION.....	157
Opportunities for Further Studies	159
APPENDICES	164
A: GPR Overlays with Historic Maps and Aerial Photos.....	164
B: GPR Profiles	175
C: Historic Map Overlays.....	192
D: Maps for Further Study.....	197
BIBLIOGRAPHY.....	204

LIST OF FIGURES

Figure	Page
1	Example of a hornwork from Charles Blaskowitz’s <i>A Plan of the siege and Surrender of Charles Town, 1780</i> 4
2	“ <i>A Plan of the Siege and Surrender of Charles Town 1780</i> ” By Charles Blaskowitz:..... 5
3	<i>Plan of Charles Town by George Taylor 1781</i> Courtesy the University of Michigan Map Library 6
4	<i>Scavenius Map of Charlestown – Count Scavenius Map</i> Collection Dartmouth University..... 7
5	<i>The Charles Blaskowitz Map 1780</i> georeferenced with modern Wragg Square..... 11
6	<i>The Charles Blaskowitz Map 1780</i> , georeferenced with modern-day Chapel Street..... 12
7	Modern-day Marion Square georeferenced with modern- day King Street. 13
8	Blaskowitz map showing defenses georeferenced in the vicinity of Vanderhorst and Coming Street. 14
9	<i>The George Taylor Map 1781</i> showing the American defense line georeferenced in the vicinity of Vanderhorst and Coming Streets 15
10	The fortification (A) built after the British occupation of the city..... 21
11	<i>Blaskowitz Map 1780</i> . Battery seen on Hampstead Hill..... 22
12	<i>Charles Blaskowitz Map 1780</i> . Two redoubts to the west in the first parallel on the Ashley River..... 23

13	<i>George Taylor Map 1781</i> . First parallel.	24
14	<i>Charles Blaskowitz Map 1780</i> . Artillery battery in the center of The Broad Path” modern day King Street.	25
15	<i>George Taylor Map 1781</i> . Sap trenches that connected the siege parallels.	26
16	<i>A Plan of Charles Town by George Taylor 1781</i> The Second and third Parallel.	26
17	<i>The Charles Blaskowitz Map 1780</i> overlaid with a modern aerial view of Charleston.	48
18	<i>The George Taylor Map 1781</i> overlaid with a modern aerial view of Charleston.	49
19	LiDAR view and Taylor map overlaid with an aerial view of Hampstead Hill.	52
20	Plan view of Wragg Square GPR survey results.	56
21	Profile view of Wragg Square GPR transects.	56
22	Survey area of Trident Technical College Parking lot, overlaid with the Taylor Map and the 1951 Sanborn Map, red box indicates the <i>survey</i>	63
23	The Cigar Factory parking lot overlaid with the Sanborn Map of 1951 and the Blaskowitz Map of 1780; red box indicates the survey area.	64
24	The georeferenced Taylor Map with the Cigar Factory parking lot.	65
25	<i>Charles Blaskowitz Map 1780</i> overlaid with the modern landscape.	66
26	<i>A Plan of Charles Town by George Taylor 1781</i> The Second and third Parallel.	67

27	<i>The Bird's Eye View of Charleston: 1872.</i> Hampstead Hill showing little changes to the area since the Revolution	68
28	1954 Aerial Imagery of Hampstead Hill. University of South Carolina Ariel Imagery Library.....	69
29	Hampstead Hill as seen on LiDAR.....	71
30	Hampstead Hill LiDAR with Blaskowitz map overlay.	72
31	Hampstead Hill LiDAR with George Taylor map overlay.	73
32	Area 1 plan view at 2 feet: Cigar Factory West Showing a Utility Pipe	76
33	Plan view of area 2 at 2 feet below the surface showing the Cigar Factory Parking Lot.....	77
34	Hampstead Hill LiDAR with George Taylor map overlay.....	79
35	Plan view at 2 feet below Trident Technical College Parking Lot.....	81
36	Third parallel trench from the <i>Blaskowitz Map</i> overlaid on the modern landscape.....	84
37	Overlay of the <i>George Taylor Map 1781</i> with an aerial photograph of Wragg Mall.....	85
38	Wragg Mall as seen on the 1801 <i>A Plan of</i> <i>Wraggsborough</i> by Joseph Purcell.	86
39	<i>John Diamond Plat 1807</i> – Overlaid with a modern photo of Wragg Mall.	87
40	<i>Bird's Eye View of the City of Charleston,</i> <i>South Carolina 1872.</i> Area showing Wragg Mall.	88
41	Aerial Photograph of Wragg Mall in 1957: Courtesy University of South Carolina Libraries.	89

42	Wragg Mall: LiDAR showing the area of Wragg Mall On high ground, appearing in yellow.	91
43	Wragg Mall LiDAR with Blaskowitz overlay.	92
44	LiDAR of Wragg Mall Taylor Map.	93
45	Plan view of Wragg Mall at 1.37 feet, with profile views showing what is beneath the ground.	96
46	GPR survey of Wragg Mall at 1.37 feet overlaid with an aerial photo.	97
47	<i>George Taylor Map 1781</i> : Overlaid on a modern aerial photo of Wragg Square.	100
48	Charles Blaskowitz Map: georeferenced on a modern aerial photograph of Wragg Square	101
49	Wragg Square – <i>A Plan of Wraggsborough 1801</i> by Joseph Purcell	103
50	Wragg Square John Diamond plat 1807, overlaid on a modern aerial photo.	104
51	<i>Bird’s Eye View of the City of Charleston 1872</i> showing Wragg Square	105
52	Aerial Photograph of Wragg Square in 1957.	106
53	Wragg Square LiDAR scan.	108
54	Wragg Square LiDAR with the <i>Charles Blaskowitz Map 1780</i>	109
55	George Taylor Map <i>A Plan of Charles Town 1781</i> over laid with LiDAR data.	110
56	Wragg Square showing features 1-3 at three feet in plan.	113
57	Wragg Square showing feature two on the right	114
58	Wragg Square showing feature 4 in bottom right.	115

59	Plan View at 3 feet below the surface, Wragg Square.....	116
60	North profile of trench feature in Wragg Square 2016 excavation.	118
61	Red Box Showing where the 2016 excavations took place	119
62	<i>Charles Blaskowitz Map 1780</i> showing the hornwork georeferenced with an aerial photograph.	123
63	George Taylor Map <i>Plan of Charles Town 1781</i> Georeferenced to an aerial photograph.....	124
64	Joseph Purcell 1798 Plat of Public Lands etc.	125
65	A Plan of Wraggsborough 1801 by Joseph Purcell overlaid on a modern aerial photograph	126
66	<i>A Plan of a Part of Charleston Neck</i> by John Diamond 1807, georeferenced with a modern aerial photograph.	127
67	<i>The Bird's Eye View of Charleston 1872.</i> Red box indicates Marion Square.....	128
68	Aerial photograph of Marion Square in 1954. Courtesy University of South Carolina libraries.....	129
69	Marion Square shown with LiDAR imagery from NOAA.....	131
71	<i>Charles Blaskowitz Map 1780.</i> Overlaid on the NOAA LiDAR imagery showing the hornwork in Marion Square.	132
72	<i>George Taylor Map 1781.</i> Overlaid on the NOAA LiDAR imagery showing the hornwork in Marion Square.....	133
73	GPR plan view at 2.4 feet of Marion Square overlaid on a modern aerial photograph.	136
74	GPR plan view at 2.4 feet with hornwork highlighted.	137

75	GPR plan view of tabby remnant, top photo. Profile view of tabby remnant, bottom photo.	138
76	Profile of transect showing upside down “U” ditch feature. Image courtesy of Jon Marcoux.....	139
77	Drawing of Revolutionary War era barracks on the College of Charleston campus.	141
78	Blaskowitz map overlaid on a modern aerial photograph, showing the barracks.....	143
79	George Taylor map depicting the Cistern Yard overlaid a modern aerial photograph.	144
80	McCrary plat 3713 drawn by Purcell in 1801.	145
81	McCrary plat 222 overlaid on a modern aerial photograph. Undated.	146
82	<i>Bird’s Eye of Charleston, 1872</i> , showing the Cistern Yard and survey area on the College of Charleston	147
83	1954 aerial photograph showing the Cistern Yard and survey area.	148
84	Cistern Yard LiDAR from NOAA.....	150
85	Cistern Yard LiDAR with Charles Blaskowitz map overlay.....	151
86	Cistern Yard LiDAR with George Taylor map overlay.....	152
87	Plan view of the south west corner of the Cistern Yard with areas of high reflectivity.	155
88	GPR survey plan view at 4 and a half feet below ground.....	156
89	<i>Siege of Charleston, by Alonzo Chappel c.1862</i>	158

CHAPTER ONE

INTRODUCTION

The year was 1984, and Douglas Scott, a battlefield archaeologist, was deep in the search for the boundaries of the Little Big Horn battlefield.¹ By chance, a brush fire swept through the area and cleared enough brush for Scott to take interest in a search.² Scott's success in locating the battlefield was attributed to metal detection technology to find the boundaries of the battlefield. It was Scott's research, some scholars believe, that truly began the modern age of conflict archaeology.³ His research into the Battle of Little Big Horn sparked other searches all over the world for boundaries of battlefield conflicts. Following Scott's success in locating the boundaries of the Little Big Horn battle, researchers began searching for battlefields and fortifications using various advanced search methods. The advance in technology utilized to locate battlefield features has led to clear results and accurate findings. In turn, these findings have led to a better understanding of the strategies and tactics involved on both sides of the conflict.

In the early months of 1780, Charles Town, South Carolina, was preparing to ward off a British siege to take the city during the American Revolution. By May, the siege of 1780 was successful on the side of the British, and the battle left behind

¹ Douglas D. Scott and Andrew P. McFeaters, "The Archaeology of Historic Battlefields: A History and Theoretical Development in Conflict Archaeology," *Journal of Archaeological Research* 19, no. 1 (March 2011): 103–32, <https://doi.org/10.1007/s10814-010-9044-8>.

² "[Interview] Q&A with Little Bighorn Archaeologist Douglas Scott | National Trust for Historic Preservation," accessed March 14, 2021, <https://savingplaces.org/stories/interview-qa-little-bighorn-archaeologist-douglas-scott>.

³ "[Interview] Q&A with Little Bighorn Archaeologist Douglas Scott | National Trust for Historic Preservation."

remnants for future researchers to study. Over the past several years, studies have been conducted on the Charleston peninsula to locate battlefield features from the American Revolution. Researchers in Charleston have utilized advanced search methods to locate battlefield features from the siege of 1780. Several of these searches found possible portions of these areas.⁴ Portions of the tabby fortification in Marion Square located using these techniques eventually led researchers to a better interpretation of the battle.⁵ However, a lack of resources and other variables have led to some portions of this conflict remaining unknown.

This thesis utilizes a number of methods that have proven successful in locating battlefields around the world and applies them to the Charleston peninsula in order to identify remnants of fortifications, earthwork defenses and siege trenches related to the Siege of 1780. In order to understand how these methods have been used in the past, other battlefield archaeological reports were reviewed. These successful studies have utilized historic accounts from individuals on the field the day of battle, GIS (geographic information systems) to georeference historic maps, LiDAR to understand the topography of the land, and GPR (ground penetrating radar) to locate subterranean features.⁶ These

⁴ Carl P. Borick et al., *Searching for the 1780 Siege of Charleston: History, Archaeology and Remote Sensing* (Archaeological Contributions 51, The Charleston Museum, 2020).

⁵ Butler, Nic "The Horn Work: Marion Square's Tabby Fortress," *The Charleston Time Machine*. May 29, 2020. <https://www.ccpl.org/charleston-time-machine/horn-work-marion-squares-tabby-fortress>

⁶Eric C Poplin et al., *Archeological Investigation of the Congaree Creek Battlefield 14-15 February, 1865*, GA-2287-13-020, 2015; Daniel Elliott, *The Revolutionary War Battlefield at Purysburg, South Carolina: Search and Discovery*, Research Grant #2287-14-009 (The Lamar Institute, Inc, 2016); Jess Robinson PhD, *Geospatial Mapping of the Landward Section of Mount Independence Project: A Cooperative Project between the American Battlefield Protection Program and the Vermont Division for Historic Preservation*, Grant #GA-2287-16-020 (American Battlefield Protection Program (ABPP), 2018); Victor D. Thompson, Chester B. DePratter, and Amanda D. Roberts Thompson, "A Preliminary Exploration of Santa Elena's Sixteenth Century Colonial Landscape through Shallow Geophysics," *Journal of Archaeological Science*:

methods to locate battlefield features are being applied to various areas on the Charleston peninsula based on georeferenced historic maps.

The location of the American Revolutionary War defenses and siege lines are vital to telling the story of the 1780 surrender of Charles Town. It also explains how the key players on the British side planned their attack on the Charleston peninsula. This battle was a blow to the Americans and turned the tide of the war. It was not until several other key battles were won by the American Forces that the outcome of the war turned in favor of the Americans. The siege lines paint a clear picture of how British troops were effective in their approach to the city, and the American line of fortifications stretching from the Ashley River to the Cooper River will tell the story of the American defense.

The findings of this thesis show that the siege lines and fortifications are consistent with the maps that were drafted by two key surveyors, Charles Blaskowitz and George Taylor. The methods used in this thesis proved to be successful in locating three areas associated with the 1780 Siege of Charleston. These areas where battlefield features were located include a clearly defined defense in Wragg Square, a tabby foundation possibly related to the hornwork in Marion Square, and the possible foundation of a barrack building where troops stayed during the siege. A hornwork is a defensive

Reports 9 (October 2016): 178–90, <https://doi.org/10.1016/j.jasrep.2016.06.055>; Rob Collins, “Hadrian’s Wall and LiDAR New Features in an Ancient Frontier Landscape,” *New Castle University*, FREDHI Report 1, 2015; Federico Bernardini et al., “Early Roman Military Fortifications and the Origin of Trieste, Italy,” *Proceedings of the National Academy of Sciences* 112, no. 13 (March 31, 2015): E1520–29, <https://doi.org/10.1073/pnas.1419175112>; Sigrid Arnott and David Maki, *Results of a Phase I Archaeological Investigation of the Wood Lake Battlefield, Yellow Medicine County, Minnesota*, ABPP Project: GA-2287-14-021 (For the Wood Lake Battlefield Protection Association, 2016).

fortification with two bastions positioned like the horns of a bull and attached by a curtain wall (Figure 1).



Figure 1: Example of a hornwork from Charles Blaskowitz's *A Plan of the siege and Surrender of Charles Town, 1780.*

This thesis is divided into four chapters; in chapter 2, relevant literature explores the methodology of similar archaeological sites. The methodology used in the location of battlefield features is from Europe and the United States. These successful methods eventually led to a better understanding of key sites in European and American History.

Chapter 3 is about the unique methodology used in this thesis; these methods had never been tested in Charleston. Chapter 4 details the results of the methodology used on the Charleston peninsula in six key areas, Hampstead Hill, Wragg Mall, Wragg Square, Marion Square, and the Cistern Yard at the College of Charleston campus.



Figure 2: "A Plan of the Siege and Surrender of Charles Town 1780" By Charles Blaskowitz – Courtesy The National Archives United Kingdom.

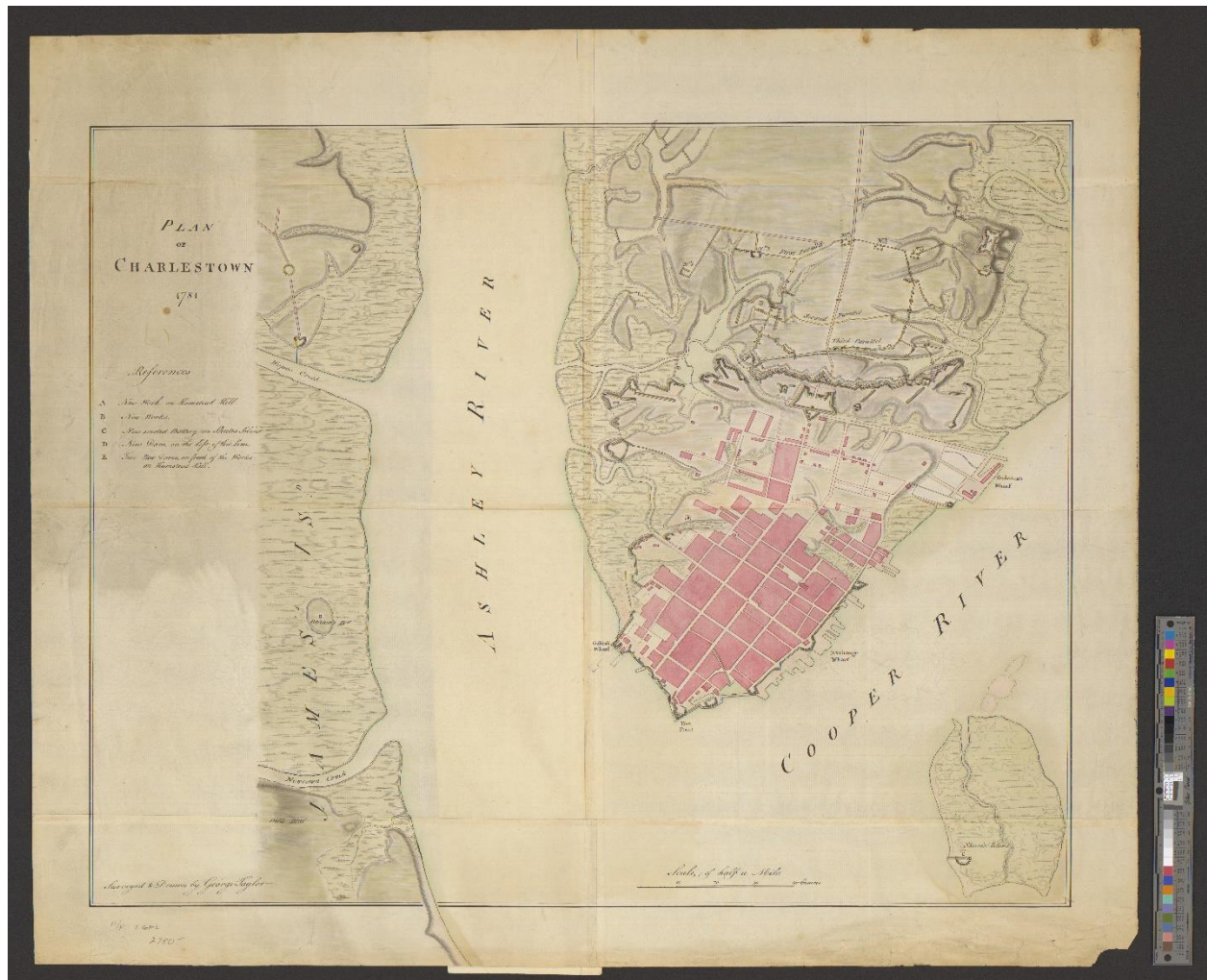


Figure 3: "Plan of Charles Town" By George Taylor 1781 – Courtesy the University of Michigan Map Library.



Figure 4: Scavenius Map of Charlestown – Count Scavenius Map Collection Dartmouth University.

The History of the Siege of Charles Town - 1780

In order to understand the significance of this study, the history of the Siege of Charles Town in the Spring of 1780 is included in this chapter to provide context for the location of the siege trenches and defensive works that were laid out on the peninsula during the siege. This chapter draws heavily on Carl Borick's work in *A Gallant Defense*, which detailed the siege through an analysis of the journals of General Clinton, General Moultrie, and other sources.⁷

The strategy of the Royal forces in America shifted to the southern colonies early in the American Revolution. They were hopeful that their focus in the southern colonies would end the American Rebellion. With their sights set on Charles Town, they made several attempts to control the peninsula before finally succeeding in 1780.⁸ General Clinton, Commander of the British troops in America, set sail for Charles Town harbor in mid-June of 1776. The plan was to take the city from the harbor. However, the Americans were already prepared for a possible assault on Charles Town and began the construction of a palmetto log fort on the southern tip of Sullivan's Island. Commodore Peter Parker aided in the first attempt to take Charles Town in 1776 and attacked the Palmetto Fort from the harbor while British troops attempted to cross Breach Inlet on foot.⁹ The inlet proved to be too deep for the British soldiers, and the Palmetto fort at Sullivan's Island absorbed the shot fired from the ship's cannons. General Clinton left the

⁷ Carl P. Borick, *A Gallant Defense* (University of South Carolina Press, 2003).

⁸ Carl P. Borick, *A Gallant Defense* (University of South Carolina Press, 2003), 1.

⁹ Borick, 6.

Charles Town area in the hands of the American Army after they were unable to complete a siege on the town. But the defeat in 1776 did not deter him from trying again. By 1779, General Clinton was ready to try a siege on Charles Town again. The planned attack on Charles Town caused General Moultrie, Major General Lincoln's second in command, to occupy and defend Charles Town with a little over 3,000 troops. Meanwhile, Lincoln was on his way to Charles Town just as General Prevost of the British Army was as well. Eventually, General Prevost found himself between two armies, General Moultrie's on the peninsula and Major General Lincoln's behind them. Prevost decided he was outnumbered and left the Charles Town peninsula under the cover of night. For the second time, the Americans defeated the British by defending the Charles Town peninsula against Prevost's foray against Charles Town. However, exactly one year later to the day, in May of 1780, the British Army would succeed in their attempts to capture the Charles Town peninsula.

In December of 1779, General Clinton amassed enough men to attempt another attack on Charles Town.¹⁰ With a force of over 8,000 men, General Clinton set sail from New York City to the Southern Colonies. His plan was to attack the peninsula from land this time with more troops, since the defenses along the peninsula from the north were weaker than they were from the sea. In the early months of 1780, the British fleet sailed from New York harbor with a total of ninety troopships and fourteen warships and more than eight thousand soldiers and sailors.¹¹ The plan was to sail into Savannah, Georgia,

¹⁰ Borick, *A Gallant Defense*, 6.

¹¹ "Battle of Charleston Facts & Summary," American Battlefield Trust, January 27, 2017, <https://www.battlefields.org/learn/revolutionary-war/battles/charleston>.

rendezvous with forces stationed there, and sail to Seabrook Island of South Carolina, while another force commanded by James Patterson marched over land to Charles Town.¹² Intelligence of the General's intention to attack the city reached Charles Town, and Benjamin Lincoln was prepared to defend the peninsula.

Anticipating another attempt on Charles Town, Benjamin Lincoln set out to inspect the current defense line that stretched across the Charles Town neck and the hornwork in present day Marion Square.¹³ The defense line that stretched across the Charles Town neck at that time was constructed in 1750 by French engineer William Gerald deBram, and by 1779 was still half finished. The condition of the defense lines in December of 1779 concerned Benjamin Lincoln, and he ordered French engineers in alliance with him (Colonel Jean Baptiste Joseph, the Chevalier de Laumoy and Lieutenant Colonel Louis Antoine Jean Baptiste, the Chevalier de Cambray-Digny) to redesign the defenses across the Charleston neck.¹⁴ In order to complete this monumental task, he gathered 1,600 enslaved laborers from across Charles Town, who were owned by individuals living on the peninsula. The defense lines were built in haste by the enslaved laborers and finished by the Spring of 1780.¹⁵ As laid out by Borick and confirmed in this study, the defense line stretched from the Cooper River to the Ashley River. It ran almost exactly along modern-day Chapel Street, straight through Wragg Square, through the modern-day Embassy Suites Hotel (formally the Citadel in the nineteenth century), across

¹² Borick, *A Gallant Defense*, 26.

¹³ Borick, *A Gallant Defense*, 41.

¹⁴ Borick, 42.

¹⁵ Borick, 43.

King Street (with the hornwork's gate straddling modern day King Street), and ending near modern day Coming Street. There were a few more defense lines ending near Pitt Street where the historic marsh began, according to historic maps and LiDAR imagery.



Figure 5: *The Charles Blaskowitz Map 1780* georeferenced with modern Wragg Square.



Figure 6: *The Charles Blaskowitz Map 1780* georeferenced with modern day chapel street.

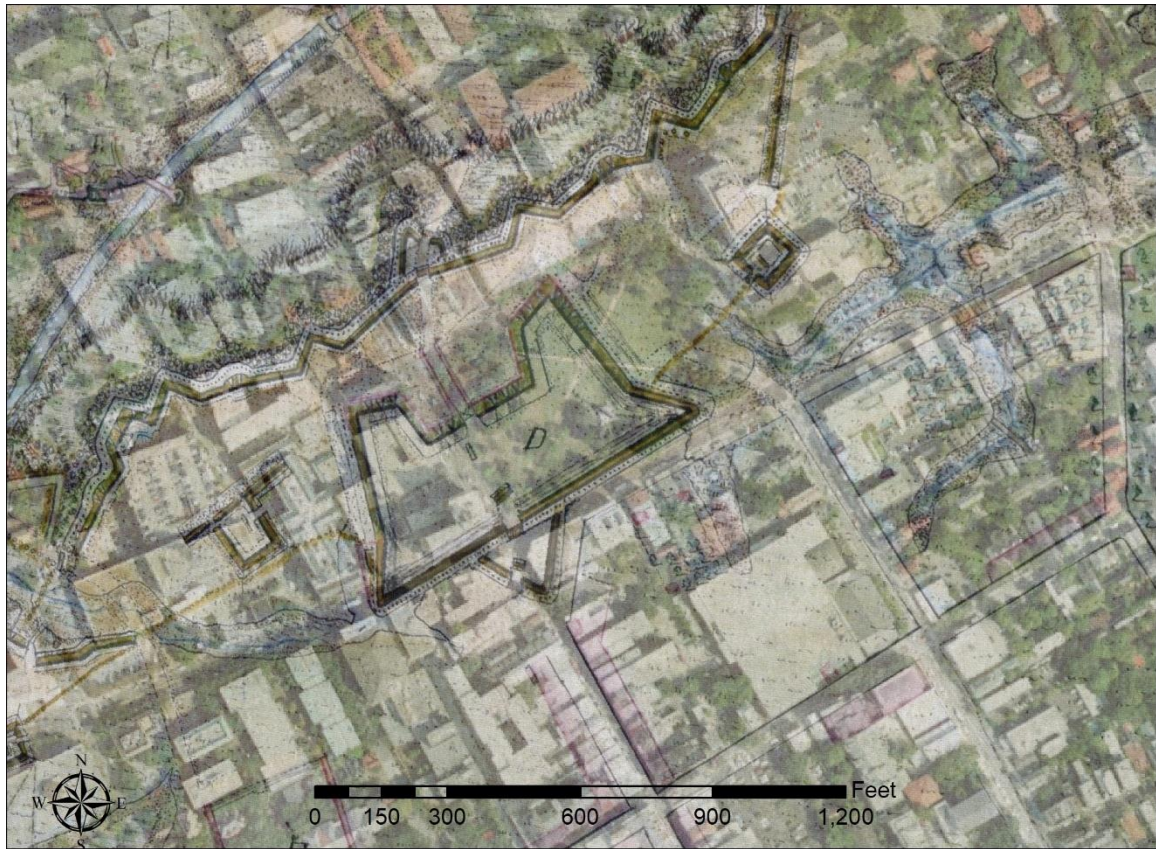


Figure 7: Modern day Marion Square georeferenced with the modern-day King Street.

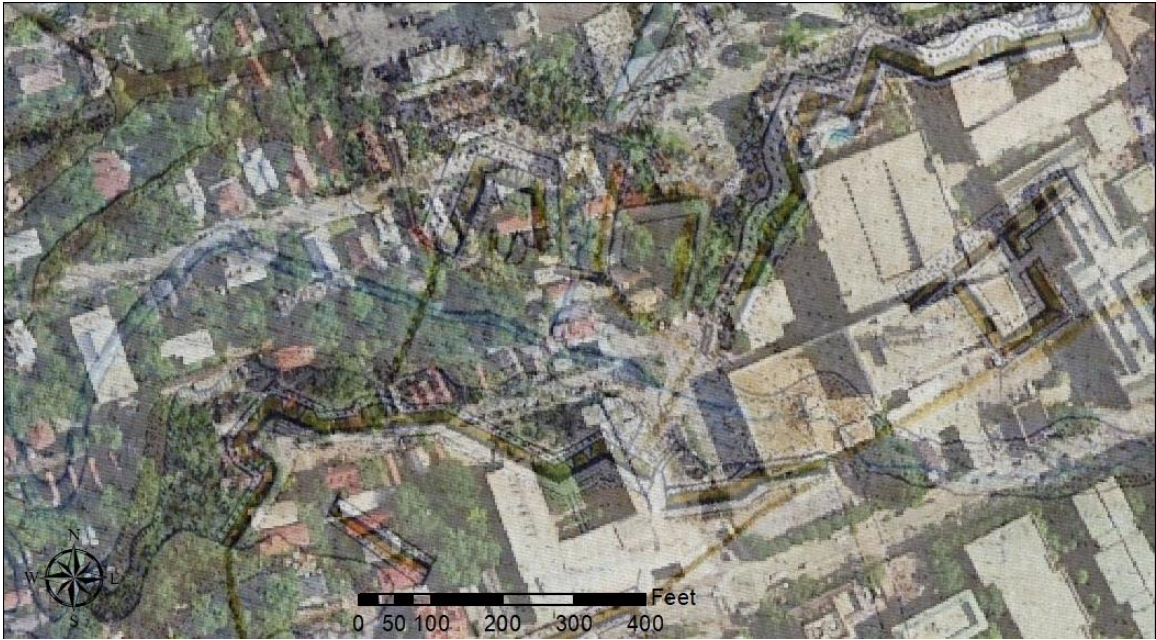


Figure 8: Blaskowitz map showing defenses georeferenced in the vicinity of Vanderhorst and Coming Street.

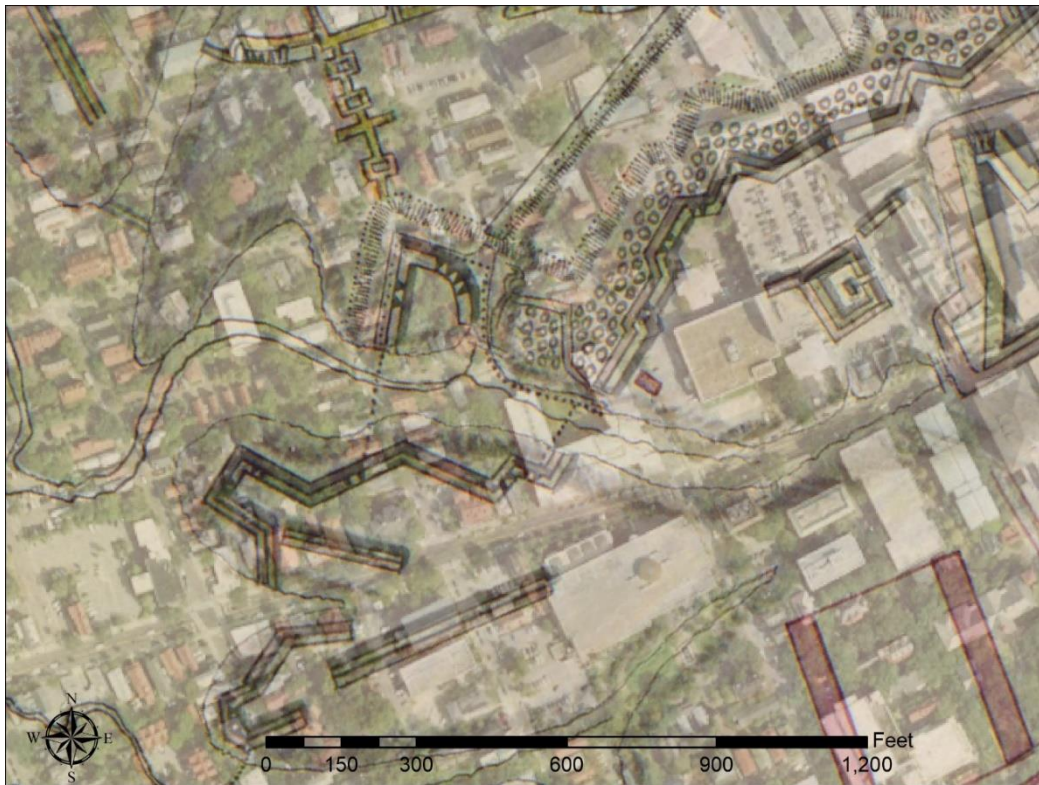


Figure 9: The George Taylor Map 1781 showing the American defense line georeferenced in the vicinity of Vanderhorst and Coming Streets.

The decision to besiege Charleston was made in the late months of 1779. General Clinton and his men landed on Seabrook Island in February of 1780 and made the trek over land knowing that the Americans would have them in their sights. Previously, the American Army had destroyed bridges that would have allowed British troops to cross the Wappoo Creek, (just west of the Ashley River), providing quick access to Charles Town. Clinton and his men set out to repair the damaged bridges, and in the early morning hours of March 4 they marched over to the west bank of the Ashley River.

Realizing that his army was within firing distance of the Coming's Point Battery on the western part of the Charles Town peninsula, Clinton decided to establish a battery on Fenwick Point in order to protect his army from any Continental ships attempting to attack from the Ashley River. The Fenwick Point Battery is now on current day Albermarle Point, just west of the Ashley River, on privately owned property.¹⁶ On March 11, 1780, Clinton ordered his second in Command, Cornwallis, to burn down a house on Fenwick Point to provide a clear point of fire for the battery. By that evening, Major Moncreif, the British engineer in charge of defenses, traced out the battery. On the morning of March 12, the finishing touches on the fortification were completed. The Americans attempted to disarm the battery to rid the threat of guns aimed directly at the peninsula. Two ships, the *Lee* and the *Bretigny* from the Continental Navy, attempted to take out the battery, but they were no match for the thirty-two-pound shot fired directly at their vessels. Both ships retreated to the safety of the Charles Town peninsula after the engagement. Another ship from the Continental Navy, the *Notre Dame*, anchored off Fenwick Point by a misunderstanding of orders. The battery at Fenwick Point fired upon the *Notre Dame*, destroying the rigging, but the sailors were able to escape before any more damage was caused to the ship. Later, the inhabitants of the Charles Town peninsula found cannonballs near Coming's Point in the marsh and another one near the Sugar House. This was clear evidence that the cannons on Fenwick Point could bombard the peninsula of Charles Town if they so desired.

¹⁶ Borick, *A Gallant Defense*. 64.

Eventually, around the end of March, General Clinton made the decision to cross the Ashley River at Drayton Hall. Several days earlier, several detachments encamped on the grounds of Drayton Hall met up with General Clinton and made the passage across the Ashley via flat bottom boats captured by Captain Evans. After crossing the Ashley, the British troops disembarked at Gibbs Plantation and from there began their march to the peninsula.¹⁷

Over the next couple of months, British troops advanced on Charles Town, meeting with gun fire American troops who emerged from behind their lines to attack the advancing army. General Clinton knew that in order to be successful in his siege of Charles Town, he needed the support of the Royal Navy. He needed the coverage that the Navy would provide from the sea in order to be successful over land. In a series of letters between Commodore Abraham Whipple, and General Lincoln, Whipple admitted he held back on blocking the harbor properly against the British Naval ships. He was afraid of losing too many ships to the superior firepower of the British Navy. Eventually Whipple withdrew because he was out gunned, and the British Navy was able to enter the harbor.

In addition to the hornwork construction that began earlier in the eighteenth century, the American Army setup defensive works that ran across the Charleston neck; these included abatis, which are felled trees with spiked limbs to deter an army, and moats around six feet deep in front of the defensive works. These defensive works were built in haste, because the continental army received word that the British were advancing on Charles Town. Meanwhile, the British began digging siege trenches along the

¹⁷ Borick, *A Gallant Defense*, 107.

Charleston neck the closer they got to downtown Charles Town. As the days passed by, the American forces defended their position on the peninsula, engaging in small skirmishes from behind their lines. However, the British were concealed by the trenches and the small redoubts they had built.

Several historic accounts of the siege describe the construction of the first artillery battery on Hampstead Hill (Figures 7 & 8).¹⁸ General Clinton wrote about the Hill as a strategic point on the peninsula and a perfect place to gain the high ground. General Clinton spoke to his Chief engineer, Major Moncreif, and it was decided that a battery would eventually be built on the hill. By April 6, Cornwallis reported in his journal that the first parallel was finished. The first parallel (Figure 9) stretched from the Cooper River to the Ashley River. There was a battery on Hampstead Hill, and two more redoubts to the west before reaching modern-day King Street. On the west side of King Street there was another redoubt right beside the street, then further west two more redoubts.¹⁹ Major Moncreif also placed a forward battery (Figure 11) in the center of King Street.²⁰ By April 18, General Clinton mentioned that the second parallel “is not quite finished but to be done this night.” Sap trenches, which were vertical trenches, connected the first and second parallel (Figure 12). By each advancement in parallel and trenches, the British army was better concealed from the American firepower and gained the ability to move south on the peninsula. The second parallel stretched from the Cooper River, starting around modern-day Mary Street, halfway across the modern-day peninsula, crossing

¹⁸ Henry Clinton and William T. Bulger, “Sir Henry Clinton’s ‘Journal of the Siege of Charleston, 1780,’” *The South Carolina Historical Magazine* 66, no. 3 (1965): 149.

¹⁹ Clinton and Bulger, 149.

²⁰ Clinton and Bulger, 162.

King Street, down toward Radcliff Street, and ending near modern-day western Radcliff Street (Figure 13). By April 21, the first parallel was finished, and Clinton ordered his engineer, Major Moncreif, to arm the trenches and redoubts with their guns. It was on April 21 that General Lincoln sent a letter of cessation saying that the American Army would surrender. However, he asked if the British would consider not taking prisoners of war. General Clinton refused the offer and began firing on the Cooper River to prevent the American Army from escaping during the night. General Lincoln asked for terms of cessation a second time, but Clinton refused.

On the April 22, Moncreif started the sap that would run to the third and final parallel, closest to the American Army's line of defense.²¹ The third parallel ran from the Cooper River, across Judith Street, right through modern-day Wragg Mall, crossing through the modern-day Charleston visitors center, with a battery on the western edge (Figure 12). There was a break in the third parallel where it met the waterway across the peninsula that the American Army had built for extra defense; the rest of the parallel opened back up around the intersection of St. Philip Street and Warren Street. The opening of the third parallel would have drained the waterway, causing ease of access for the British Army. On April 24, the third parallel was still not complete, and the American Army fired upon the parallel, killing ten or twelve British soldiers. By April 29, the third parallel was finished. The British Army was now prepared to approach the defense line of the American Army and essentially siege the city by force. The siege lasted six weeks, as

²¹ Clinton and Bulger, "Sir Henry Clinton's 'Journal of the Siege of Charleston, 1780.'" 165.

the American defenses were well built. The British knew taking Charles Town would be no easy task.

On the morning of May 12, 1780, Major General Benjamin Lincoln, outnumbered by sea and by land and without reinforcements, decided to surrender the city of Charles Town to the British.²² The British Army, which numbered in the thousands, entered the city through the city gate at the hornwork and secured the streets under the British crown. Five thousand American soldiers were taken prisoner that night and did not see the end of the occupation of Charles Town for another three years. Under the Articles of Capitulation, General Clinton allowed the town's militia to return home with their personal belongings.²³

The articles of capitulation stated that the British Army took control of all the fortifications in the city.²⁴ Maps such as the second draft of the George Taylor map, drawn after the occupation of Charles Town, show extra fortifications that were planned by the British. One on Hampstead Hill appeared to be another fortification with redans and bastions. The Scavenius Map of an unknown author also showed more detailed fortifications around the city at the time. Charleston remained under the command of the British troops for the next three years until the evacuation of Charles Town at the end of the war in 1783.

²² William Moultrie, *Memoirs of the American Revolution: So Far as It Related to the States of North and South Carolina, and Georgia* (New York, Printed by D. Longworth, 1802), 106.

²³ Moultrie, *Memoirs of the American Revolution*, 100.

²⁴ Moultrie, *Memoirs of the American Revolution*, 94.



Figure 10: The fortification (A) built after the British occupation of the city.

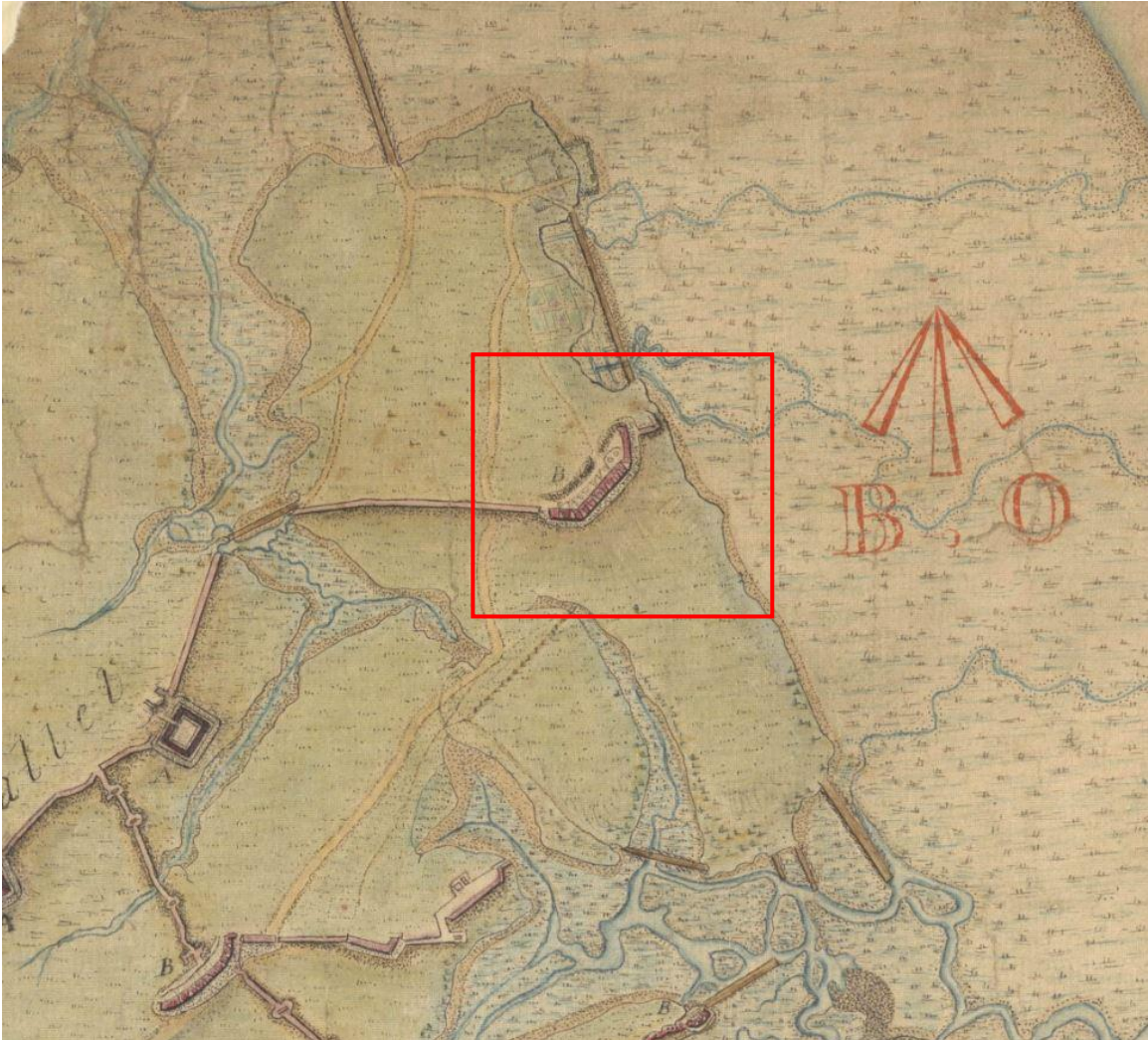


Figure 11: *Blaskowitz Map 1780*. Battery seen on Hampstead Hill.



Figure 12: *Charles Blaskowitz Map 1780*. Two redoubts to the west in the first parallel on the Ashley River.



Figure 13: *George Taylor Map 1781*. First parallel.



Figure 14: *Charles Blaskowitz Map 1780*. Artillery battery in the center of “The Broad Path” modern day King Street.

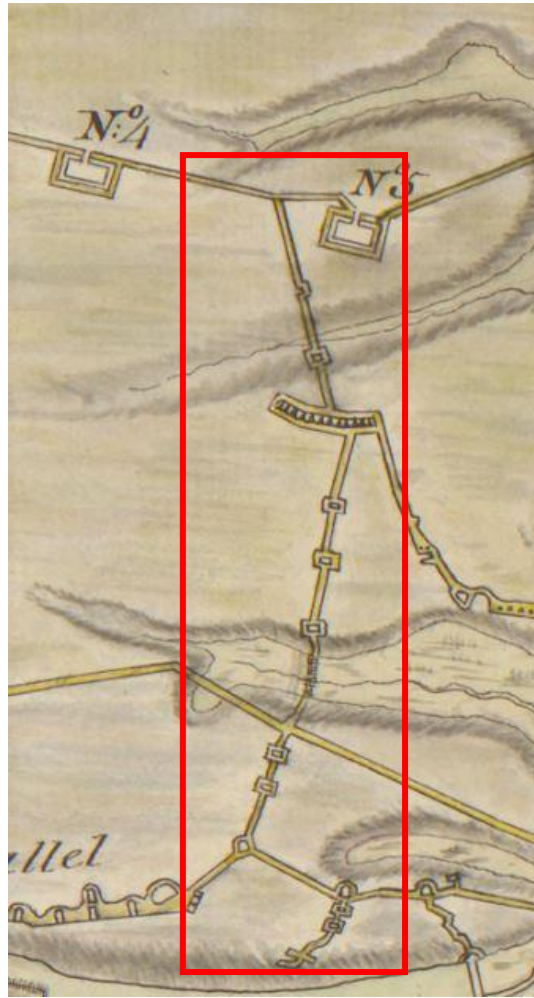


Figure 15: *George Taylor Map 1781*. Sap trenches that connected the siege parallels.

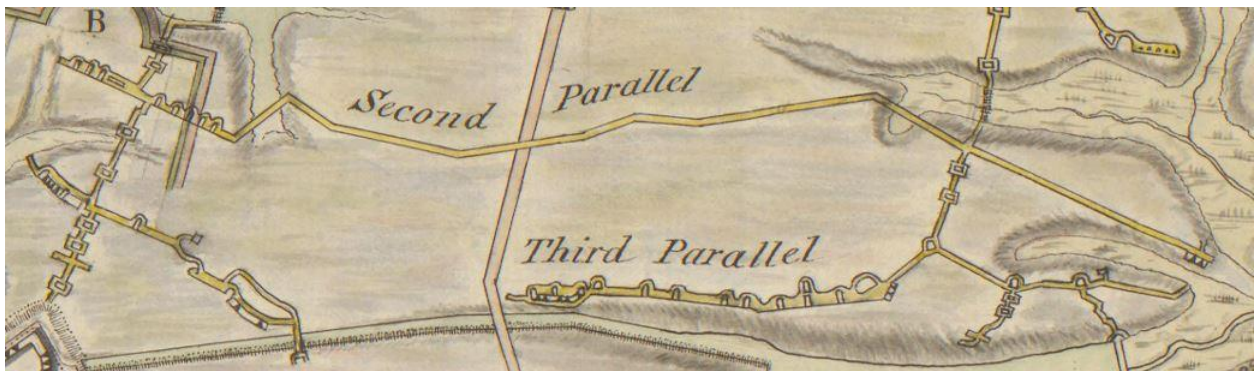


Figure 16: *A Plan of Charles Town by George Taylor 1781*. The Second and third Parallel.

CHAPTER TWO

A REVIEW OF BATTLEFIELD LITERATURE

Historic battlefields throughout the world contain a rich amount of information that teach us about various aspects of battle. These aspects include the location of battlefield features such as fortifications, siege trenches, and earthwork defenses. The identification of these features on a battlefield provides the historic record with information on how the battle was fought. The location of solid defenses such as tabby, bricks, and earth works, or other types of features such as siege trenches and ditches are the types of features usually located on battlefields.²⁵ With the target of battlefield features in mind, archaeologists have utilized various methods to locate them such as researching historic accounts, georeferenced historic maps, LiDAR, and GPR (Ground Penetrating Radar). Each method provides the researcher with proven techniques to find battlefield and fortification features. This study is limited to the methods mentioned above, but there are several other methods that have been used all over the world.²⁶

²⁵ Daniel Elliott, "The Revolutionary War Battlefield at Purysburg, South Carolina: Search and Discovery," *The LAMAR Institute, Inc.*, 2016. Other features found on battlefields include troop movements, artifact deposits, and human remains.

²⁶ Sigrid Arnott and David Maki, *Results of a Phase I Archaeological Investigation of the Wood Lake Battlefield, Yellow Medicine County, Minnesota*, ABPP Project: GA-2287-14-021 (For the Wood Lake Battlefield Protection Association, 2016); John Bedell, Gregory Katz, and Jason Shellenhamer, *Searching for the War of 1812 in Patterson Park Baltimore, Maryland* (The Louis Berger Group, 2015); Kevin Bradley et al., *Cheer up My Boys the Day Is Ours...* (Princeton Battlefield Society, 2017); Kevin Bradley et al., *Cheer up My Boys the Day Is Ours...* (Princeton Battlefield Society, 2017); Craig Brown, Christopher Maio, and Victor T Mastone, *Chelsea Creek - First Naval Engagement of the American Revolution Chelsea, East Boston, Revere and Winthrop Suffolk County Massachusetts*, No. GA-2255-09-018 (American Battlefield Protection Program (ABPP), 2011); Wade P Catts et al., "It Is Painful for Me to Lose So Many Good People" *Report of an Archaeological Survey at Redbank Battlefield Park (Fort Mercer), National Park Gloucester County, New Jersey*, GA-2287-14-004, 2017; Daniel Elliott, *The Revolutionary War Battlefield at Purysburg, South Carolina: Search and Discovery*, Research Grant #2287-14-009 (The Lamar Institute, Inc, 2016); Eric C Poplin et al., *Archeological Investigation of the Congaree Creek*

This literature review focuses on past research conducted to find various battlefields and features (fortifications, siege trenches and earthworks). The methods discussed and studied for this review are found in reports that utilized specifically historic accounts, historic maps combined with modern georeferencing techniques, LiDAR, and GPR (Ground Penetrating Radar). This chapter summarizes past work with respect to methodology, beginning with historic accounts, georeferencing historic maps, LiDAR and GPR. The analysis of the literature listed below demonstrates that techniques have different strengths and weaknesses depending upon the type of feature.

***Historic Accounts to Locate Battlefield Features
in Europe and America***

One method of locating battlefield features is using actual historic accounts from those present on the field of battle. Accounts of landscape features near the battle such as topography, rivers, and surviving towns aid researchers in pinpointing features that have survived since the time of battle.²⁷ Accounts can include letters, journal entries, and other sources.²⁸ Once the features are located in the narrative, they can be compared to different maps of the same landscape through time to figure out when the features

Battlefield 14-15 February, 1865, GA-2287-13-020, 2015; Kenneth Reid et al., *Bear River Massacre National Historic Landmark, Franklin County Idaho*, GA-2287-13-013, 2017; Jess Robinson PhD, *Geospatial Mapping of the Landward Section of Mount Independence Project: A Cooperative Project between the American Battlefield Protection Program and the Vermont Division for Historic Preservation*, Grant #GA-2287-16-020 (American Battlefield Protection Program (ABPP), 2018).

²⁷ “Battle of Maldon 991, Maldon - 1000019 | Historic England.”

²⁸ “Battle of Maldon 991, Maldon - 1000019 | Historic England.”

disappeared from the landscape. With these accounts aiding in location, the battlefield and features such as fortifications, siege trenches and earthworks can be found.

There are several examples from European and American battlefields that have been located using historic accounts from individuals on the battlefield.²⁹ Some of the oldest battlefields were recorded by King Alfred the Great in the Anglo-Saxon Chronicles during the Viking invasions of Europe.³⁰ After King Alfred's death, monks continued to finish his chronicles and, later, European kings added to the chronicles. In modern times, the Anglo-Saxon Chronicles and a poem were used to locate the battlefield features at Maldon, fought in 991 AD.³¹ Other battlefield reports on the heritage list such as the Battle of Northampton, fought in 1460, during the English War of the Roses, also used landscape features mentioned in historic accounts to place the battlefield.³² Like the Battle of Maldon, this report also considers the evolution of the land, since the battle was fought six hundred years ago.

In America, these techniques have also been used. In a battlefield report to locate the Revolutionary War Battlefield at Purysburg, South Carolina, researchers relied heavily on battlefield accounts to locate the battlefield.³³ Daniel Elliott, the team's lead

²⁹ "Search the List - Find Listed Buildings, Monuments, Battlefields and More | Historic England," accessed December 20, 2020, <http://historicensland.org.uk/listing/the-list/>.

³⁰ Thomas J. T. Williams, "Landscape and Warfare in Anglo-Saxon England and the Viking Campaign of 1006," *Early Medieval Europe* 23, no. 3 (2015): 333, <https://doi.org/10.1111/emed.12107>.

³¹ "Battle of Maldon 991, Maldon - 1000019 | Historic England", 1.

³² "Battle of Northampton 1460, Non-Civil Parish - 1000028 | Historic England," accessed October 23, 2020, <https://historicensland.org.uk/listing/the-list/list-entry/1000028>. The War of the Roses were a series of battles fought in England by two rival families to determine which family deserved the throne of England.

³³ Elliott, *The Revolutionary War Battlefield at Purysburg, South Carolina*, 9.

researcher, used sources from along the East Coast from South Carolina to New England and a few sources from England. Narratives, including personal correspondence from Major General Benjamin Lincoln, mention earthworks and fortifications in various places throughout the Purysburg battlefield area. In the end, because the fortifications and earthworks were mentioned in correspondence relating to Purysburg, they ultimately helped in their rediscovery and future interpretation.³⁴

In all the cases showing the use of battlefield narratives to locate a fortification or a battlefield, the research was followed up with geospatial mapping such as LiDAR and GPR or archaeological methods such as hand excavation and metal detection. In the cases of open battlefield warfare, the only way to locate the boundary of the battlefield was to use the narrative to guide archaeological digs. The narrative helped to locate artifacts from the battle to see if they were within the boundaries of the proposed battlefield as seen in historic accounts. The results could help the researcher define the boundaries of the actual battle. This technique was especially apparent in the reports from the Bear River Massacre Battlefield, located in Franklin County, Idaho, and from the Wood Lake Battlefield, located in Yellow Medicine County, Minnesota.³⁵

The narratives mentioned the fortifications and landscape features on the battlefield, and they helped to focus the research. Some of the historic accounts mentioned in this literature review were written years after the battle was fought, and in

³⁴ Elliott, *The Revolutionary War Battlefield at Purysburg, South Carolina*, 147.

³⁵ Arnott and Maki, *Results of a Phase I Archaeological Investigation of the Wood Lake Battlefield*, 20; Reid et al, *Bear River Massacre National Historic Landmark, Franklin County Idaho*, 3.

many cases, had changed drastically since the time of battle. It was also found that some of the narratives did not line up exactly with where key features were eventually found. The length of time between the battle and the narrative could be impacted by the fading memory of those involved and development to the land that leveled some of the earthwork features.

The literature of battlefield historic accounts provides a framework to build upon in locating the battlefield features. The key to locating battlefield features in Charleston is being able to understand the changes to the land since the narratives were given, compared to changes in chronological maps of the peninsula. With this information, the narratives can be compared to historic maps that are georeferenced on GIS.

GIS to Georeference Historic Maps in Europe and America

Geographic Information System is a computer program that allows the user to manipulate maps in many ways.³⁶ The ability to use historic maps to overlay on the modern landscape is a useful tool in locating key battlefield and fortification features. The best examples of georeferenced historic battlefield and fortification maps are from America.

Maps georeferenced with the aid of the GIS program have been used in several examples. The National Park Service and various universities in America used historic maps to georeference the modern landscape. The ability to use historic maps with the

³⁶ “What Is GIS? | Geographic Information System Mapping Technology,” accessed December 11, 2020, <https://www.esri.com/en-us/what-is-gis/overview>.

modern landscape has great potential to identify where battlefields and features related to them are located. A report written on the Woodlake Battlefield relied on georeferenced maps to locate the confines of the battlefield.³⁷ This research as well as research done on the Bear River Massacre also used georeferenced maps to locate battlefield features. It was in the Bear River Massacre report that the researchers located a map that was unknown in other research projects done on the area. This particular map was unpublished until 1999 and was a major asset in aiding researchers to locate the battlefield.³⁸ The Battle of Chelsea Creek, fought during the American Revolution was another focus of research that used georeferenced maps to aid in the location of the battlefield. The base map was georeferenced with the modern landscape providing researchers with a base to utilize other methods of research. One of the most compelling finds that used geo-referencing to locate the battlefield was the research into the Battle at Purysburg.³⁹ They located two maps from the battle including one from Major Ferdinand Joseph Sebastian DeBrahm from January 9, 1779.⁴⁰ When georeferenced, this map provided the closest proximity to actual battlefield features which were proven through other archaeological methods.

Most of the projects examined for this literature review used historic maps in their search for battlefield features or fortifications. However, the fact that they were georeferenced was either not mentioned or if mentioned, not in detail. In several of the

³⁷ Arnott and Maki, *Results of a Phase I Archaeological Investigation of the Wood Lake Battlefield*, 10.

³⁸ Reid et al., *Bear River Massacre National Historic Landmark, Franklin County Idaho*, 6.

³⁹ Elliott, *The Revolutionary War Battlefield at Purysburg, South Carolina*, 62.

⁴⁰ Elliott, *The Revolutionary War Battlefield at Purysburg, South Carolina*, 62.

reports, especially the report from the Woodlake Battlefield in Minnesota, the use of historic maps was used with caution because of the inaccuracies that the maps could hold.⁴¹ Similar to the battlefield accounts, battlefield features depicted on maps could have been done years after the battle took place, when someone's memory is fading, and therefore is inaccurate to the modern landscape.

The literature for the Charleston area has shown that the entire peninsula of Charleston has not been georeferenced with historic maps on the modern landscape. The research into the fortifications and earthworks has been conducted before, but the researchers georeferenced smaller areas, rather than the entire peninsula.⁴² For this thesis, the georeferenced Blaskowitz and Taylor maps provides geographic locations to search for the Revolutionary War fortifications and battlefield features.

LiDAR used to Locate Battlefield Features in Europe and America

LiDAR is a relatively new technology that researchers use to locate hidden battlefields and fortifications.⁴³ LiDAR stands for Light Detection and Ranging and is typically used to measure land topography. The effectiveness of LiDAR depends on one crucial factor, the development of the land since the period of significance. Despite land-altering development, LiDAR can still aid researchers in understanding topography. LiDAR imagery shows low and high spots on the land, which are crucial factors in

⁴¹ Arnott and Maki, *Results of a Phase I Archaeological Investigation of the Wood Lake Battlefield*, 21.

⁴² Borick et al., *Searching for the 1780 Siege of Charleston: History, Archaeology and Remote Sensing*, 24.

⁴³ Max van der Schriek and Willem Beex, "The Application of LiDAR-Based DEMs on WWII Conflict Sites in the Netherlands," *Journal of Conflict Archaeology* 12, no. 2 (May 4, 2017): 94, <https://doi.org/10.1080/15740773.2017.1440960>. <https://doi.org/10.1080/15740773.2017.1440960>.

battlefield planning and fortification construction.⁴⁴ LiDAR has been used in both America and Europe to locate battlefield features.⁴⁵ It is important to note that LiDAR is also used in conjunction with GIS to read the data.

LiDAR was the main method used in locating the fortification and other battlefield features at the Revolutionary War site on Mt. Independence.⁴⁶ The research revealed new features on Mt. Independence that were previously unknown. These features included living quarters, batteries, a barracks building and several other building types. In a European example, LiDAR scans of the former Roman Empire have expanded our knowledge of Roman era fortifications. For example, in Trieste, Italy, researchers used LiDAR technology to find Roman era fortifications.⁴⁷ LiDAR also revealed new discoveries related to Hadrian's Wall. In an area called Chesters, researchers believe a defensive compound was located just north of the wall. A defensive compound was an unprecedented feature for Hadrian's Wall.⁴⁸ There is also an improved understanding of forts in the Hadrian's Wall vicinity. Researchers believe that they have identified ramparts near a nineteenth century house called Castlesteads.⁴⁹ They can tell from the LiDAR scan that the fort sits on a bluff south of the wall. Also, very little was known

⁴⁴ National Oceanic and Atmospheric Administration US Department of Commerce, "What Is LIDAR," accessed December 10, 2020, <https://oceanservice.noaa.gov/facts/lidar.html>.

⁴⁵ Rob Collins, "Hadrian's Wall and LiDAR New Features in an Ancient Frontier Landscape," New Castle University, FREDHI Report 1, 2015; Robinson PhD, *Geospatial Mapping of the Landward Section of Mount Independence*, 14.

⁴⁶ Robinson PhD, *Geospatial Mapping of the Landward Section of Mount Independence*.

⁴⁷ Federico Bernardini et al., "Early Roman Military Fortifications and the Origin of Trieste, Italy," *Proceedings of the National Academy of Sciences* 112, no. 13 (March 31, 2015): E1520–29, <https://doi.org/10.1073/pnas.1419175112>.

⁴⁸ Collins, "Hadrian's Wall and LiDAR New Features in an Ancient Frontier Landscape," 1.

⁴⁹ Collins, "Hadrian's Wall and LiDAR New Features in an Ancient Frontier Landscape," 1.

about a Roman fortification at a place called Beckfoot.⁵⁰ LiDAR scans revealed a rampart inside of the fort, therefore signifying modifications to the fort in the fourth century.⁵¹ These modifications had not been seen in northern Britain before. These details revealed by the LiDAR scan are just a few that have aided researchers in understanding the motive of the Roman Empire.⁵²

LiDAR research in Charleston, South Carolina, on the Revolutionary War earthworks, the fortification in Marion Square, and the siege lines from the British advance has been studied to some extent.⁵³ LiDAR images have been used by researchers and overlaid on historic maps to focus a GPR survey. The LiDAR imagery in research conducted at the Aiken Rhett House outlined three key areas: the Aiken Rhett backyard, believed to hold a portion of the British third parallel; Wragg Mall where the third parallel continued; and Wragg Square, the location of the American defense earthwork.⁵⁴ The LiDAR results aided the researchers from the Charleston Museum in locating topographical changes but did not show the outline of trenches or the fortification in Marion Square or Wragg Square. This is mainly due to the rapid and constant development of the Charleston peninsula.

The research that uses LiDAR to find fortifications, earthworks, siege trenches, or in rare cases, the outline of a battlefield, can reveal remarkable details. As seen in the European examples, areas of Roman fortifications such as Hadrian's Wall and in remote

⁵⁰ Collins, "Hadrian's Wall and LiDAR New Features in an Ancient Frontier Landscape.", 1.

⁵¹ Collins, "Hadrian's Wall and LiDAR New Features in an Ancient Frontier Landscape.", 1.

⁵² Collins, "Hadrian's Wall and LiDAR New Features in an Ancient Frontier Landscape.", 1.

⁵³ Borick et al., *Searching for the 1780 Siege of Charleston: History, Archaeology and Remote Sensing*, 5.

⁵⁴ Borick et al., *Searching for the 1780 Siege of Charleston: History, Archaeology and Remote Sensing*, 5.

areas of Italy have revealed new information about these fortifications. Hadrian's Wall has been studied for over 250 years. However, researchers have recently used LiDAR to reveal new features. This was also seen in the American example at Fort Ticonderoga. Fort Ticonderoga's location has been known since the Revolutionary War. However, the LiDAR imagery revealed new/old earthworks just to the north of Fort Ticonderoga.⁵⁵ This new information led to the preservation of the previously unknown site. Discoveries via LiDAR at Fort Ticonderoga also led to further studies on the site.⁵⁶ A 1930 aerial photograph of the Puryburg area revealed a redoubt, which in turn led to further LiDAR studies.⁵⁷ In the Puryburg case, places located on LiDAR were completely unknown before but were suspected based on oral histories.

GPR Surveys used to Locate Battlefield Features in Europe and America

Ground Penetrating Radar (GPR) is a useful tool into locating remnant fortifications and battlefields and has been widely used all over the world, including European Countries and America. It is a device that is run over the ground which detects filled in trenches via a radar signal. In a lot of cases, GPR is used as the main tool to locate battlefield features.⁵⁸ The ability to locate fortifications and battlefields with GPR aids researchers in their interpretation of the battlefield, the boundaries of the battlefield, earthworks, siege trenches and fortifications. GPR is also a useful tool when development

⁵⁵ Ken Picard, "For Archaeologists, New Tech for Old Sites," Seven Days, accessed August 14, 2020, <https://www.sevendaysvt.com/vermont/for-archaeologists-new-tech-for-old-sites/Content?oid=3754987>.

⁵⁶ Ken Picard, "For Archaeologists, New Tech for Old Sites," Seven Days, accessed August 14, 2020.

⁵⁷ Elliott, *The Revolutionary War Battlefield at Puryburg, South Carolina*, 133.

⁵⁸ "What Is GPR: A Brief Description by GSSI," GSSI Geophysical Survey Systems, Inc., accessed March 13, 2021, <https://www.geophysical.com/whatisgpr>.

affected the area over time, which affects LiDAR data. GPR is also often used in conjunction with other methods when locating historic features. Historic accounts, historic maps georeferenced onto the modern landscape, and LiDAR all work together in planning a GPR survey grid.

Similar to LiDAR, GPR is most effective in locating fortifications rather than battlefield boundaries. When locating battlefield boundaries, other methods aid in that search more effectively. Most of the following examples are from fortifications, rather than open battlefields.

Fortifications in Trieste, Italy, from the Roman period were previously unknown. Following the LiDAR scan of the area, the researchers conducted a GPR scan. The GPR survey confirmed the findings of the LiDAR survey and identified a series of fortifications not yet discovered. These findings included the relatively undisturbed southern portion of the site, including a series of fortifications previously unknown. It also revealed other structures and ramparts. All the structures found via GPR provide researchers with a better understanding of Roman defenses in Italy during the Roman era.⁵⁹

The only difference in European GPR studies is the age of the sites compared to American examples. GPR conducted in Europe are from fortifications over a thousand years old. However, the land must be relatively undisturbed. In America, researchers are still trying to understand the American Revolution fought over two hundred years ago

⁵⁹ Bernardini et al., “Early Roman Military Fortifications and the Origin of Trieste, Italy”, 1.

and the tactics used in battle. In Patterson Park, earthwork fortifications and ditches were used during the war of 1812. The researchers from the Louis Berger Group used GPR to map out the earthworks and ditches.⁶⁰ The results of the GPR clearly showed ditches and earthworks. The ditches were in front of the earthworks to provide extra cover for the defenses. However, GPR revealed that the ditches were at different depths. It was discovered that the first ditch found was the original ditch and the second one was a commemorative ditch dug over the first one in the twentieth century.⁶¹ Ditches that were used in open battle have been located using GPR on the Princeton Battlefield. While this study turned up back filled pits which may be burials, backfilled pits are the type of feature targeted for study in Charleston.⁶²

Researchers at Fort Mercer employed GPR to locate the fortification and its associated ditches.⁶³ The entire report included GPR to locate several other anomalies associated with the battlefield. However, the clear result from the GPR study was the location of Fort Mercer's associated ditches. The ditches allow researchers to preserve the site in the correct location and to provide educational opportunities.⁶⁴

The GPR results used at the Puryburg battlefield did not yield exactly what researchers hoped. The redoubt they were searching for was found via twentieth century photographs. The researchers were unable to locate the redoubt on period maps, so they

⁶⁰ Bedell, Katz, and Shellenhamer, *Searching for the War of 1812 in Patterson Park Baltimore, Maryland*, 42.

⁶¹ Bedell, Katz, and Shellenhamer, *Searching for the War of 1812 in Patterson Park Baltimore, Maryland*, 42.

⁶² Bradley et al., *Cheer up My Boys the Day Is Ours...*, 89.

⁶³ Catts et al., *It Is Painful for Me to Lose So Many Good Men*, i.

⁶⁴ Catts et al., *It Is Painful for Me to Lose So Many Good Men*, i.

used GPS devices to reach the area of the redoubt. Once there, they laid out a survey grid for GPR. The results showed that the western side of the sample area has a linear pattern across the survey block. However, researchers were unable to determine if it was associated with the redoubt.⁶⁵

In an example from Beaufort, South Carolina, GPR was employed to locate the fortification of Santa Elena.⁶⁶ In a report titled *A preliminary exploration of Santa Elena's sixteenth century colonial landscape through shallow geophysics*, researchers Victor Thompson, Chester DePratter, and Amanda Thompson set out to locate the fortification associated with the sixteenth century fort. The GPR results revealed features consistent with a fortification, such as ditches and a possible southwest bastion.

In the previously mentioned research conducted in Charleston, South Carolina, by the Charleston Museum, GPR studies were conducted to locate portions of the fortification in Marion Square, the siege line in Wragg Mall, and siege lines at the Aiken Rhett House backyard.⁶⁷ The areas chosen for the above study were thought to be relatively undisturbed areas of land. The GPR survey of Marion Square revealed a portion of the hornwork. However, a GPR survey further east of the previous survey area and a survey along King Street might reveal more features. The studies done at Wragg Mall revealed the possible location of the British third parallel. In the backyard of the Aiken Rhett House, the GPR results identified a filled ditch which is consistent with the

⁶⁵ Elliott, *The Revolutionary War Battlefield at Purysburg, South Carolina*, 134.

⁶⁶ Victor D. Thompson, Chester B. DePratter, and Amanda D. Roberts Thompson, "A Preliminary Exploration of Santa Elena's Sixteenth Century Colonial Landscape through Shallow Geophysics," *Journal of Archaeological Science: Reports* 9 (October 2016): 180, <https://doi.org/10.1016/j.jasrep.2016.06.055>.

⁶⁷ Borick et al., *Searching for the 1780 Siege of Charleston: History, Archaeology and Remote Sensing*, 20.

British third parallel.⁶⁸ The work done by the Charleston Museum provides an opportunity for further studies into the location of these battlefield features. The previous research only identified three possible features associated with the siege. Areas of interest include features related to the first parallel on Hampstead Hill, another GPR survey of Wragg Mall in northsouth transects, a GPR survey of Wragg Square, and a GPR survey of the Cistern Yard on the College of Charleston campus believed to have the foundation of barracks related to the siege.

Conclusion

Four methods, records of historic accounts, GIS to georeference historic maps, LiDAR, and GPR, had ultimately led to the discovery of many battlefield features in Europe and America. Their success in other studies meant that they would also be successful in Charleston. Although there are drawbacks to every situation based on the location and development in the area, these methods proved successful in locating some features valuable to the history of the American Revolution in Charleston.

The drawbacks to each method are demonstrated in the literature throughout. Historic accounts of battle are impeded by foggy memories; also the stress of battle affects the memory of a potentially traumatic event. Battlefield accounts are also affected by changes in the landscape through time, affecting the ability of researchers to locate historic features on the modern landscape. Similar drawbacks are encountered with historic maps. Hand drawn maps may be inaccurate due to the lack of surveying skills of

⁶⁸ Borick et al., *Searching for the 1780 Siege of Charleston: History, Archaeology and Remote Sensing*, 29.

the author. Sometimes maps were drawn years after the battle and are inaccurate based on a fading memory. Historic map accuracy is also impacted by changes in the landscape over time. Sometimes the changes are so great that the map no longer makes sense with the current landscape. However, a chronological collection of maps since the battle aids in locating features no longer identifiable on the modern landscape. LiDAR is extremely effective in locating fortification features but not in locating the boundaries of an open battle. LiDAR shows changes in topography which can explain where battlefield features were placed. LiDAR is also only affective in areas not impacted by development. Charleston has been greatly developed since the Siege of Charleston in 1780. The results of a LiDAR study in areas not impacted by development may still hold features associated with the Siege of Charleston in 1780. These areas may be green spaces, which remained undeveloped since the Revolution. GPR has revealed the greatest results in the studies conducted so far on the Charleston peninsula. GPR is effective because radar waves reach further down into the soil to reveal trenches, ditches, or remnant fortifications, where other methods cannot. A GPR survey is also affected by heavy development to the land. If digging has occurred in the suspected area throughout the course of time, it affects the radar's ability to pick up a filled ditch. However, areas selected for study are in places lacking major building campaigns since the Revolution.

Each of these studies outlined above should not be used alone to locate fortifications or battlefield features. The methods described usually incorporated another method for successful results. Historic accounts are usually backed up by historic maps of the battlefield. Georeferenced historic maps are combined with LiDAR followed by GPR

to locate battlefield features. The combination of these methods described proved to be successful as they were in locating other battlefield features in Europe and America.

CHAPTER 3: METHODOLOGY

The literature review on fortifications demonstrates that a more in-depth study into forts and defenses related to the American Revolution in Charleston is necessary. While the fortifications have been studied to some degree before, further research to map the orientation of defenses and siege lines will provide further details into the battle. Given the constraints of time and the inability to excavate, this study could not include archaeology; however, it utilizes multiple complementary sources of information including historic accounts, GIS to georeference historic maps, LiDAR, and GPR. Research into historic accounts identifies the areas of study. Research into historic maps, historic plats, and Sanborn Maps identifies the changes to the land through time. GIS (geographic information system) gathers the map data providing a basis to lay survey grids for GPR. LiDAR is used in conjunction with the historic maps to lay out the survey area. The topography from the LiDAR data shows how the British and American forces chose areas of high ground to place siege trenches or defense lines. GPR confirms whether there are material traces of subterranean features like siege lines, tabby foundations, and earthen embankments. The methodology of each of these methods will be discussed below.

After using historic accounts to identify the study areas, GIS to georeference historic maps, and LiDAR overlaid with the historic maps, areas are then selected for a GPR survey. Then GPR tests for the best evidence of the remnant fortification, defenses, and siege trenches. The survey areas chosen for this study are based on the georeferenced maps and supporting information. These areas include Hampstead Hill to

locate the first parallel, including the Trident Technical College parking lot and the parking lot of the Cigar Factory; Wragg Mall to locate the third parallel; Wragg Square to locate the American defense line; Marion Square to locate the tabby fortification; and the Cistern Yard on the College of Charleston Campus to locate barracks related to the siege. This chapter begins by discussing the data collection methods used for this thesis and then ends with a discussion on data analysis.

Collection of Revolutionary War Maps, Plats, and Historic Accounts

To understand where to lay a GPR survey grid, research into maps created during the Siege of 1780 provided a geographic location of the features associated with the battle. Historic accounts and historic maps were taken from the University of Michigan map library, the National Archives in London, the South Carolina Historical Society, and the Charleston County Register of Deeds. Comparisons were made on each map gathered.⁶⁹ There are several maps of the Charleston peninsula made by various individuals in 1780.⁷⁰ These maps vary in their accuracy and ability to tell the story of the Siege of 1780. Some were drawn by amateurs while others were drawn by skilled surveyors who were at the siege. Prior to this study, the map of the “Siege of Charles Town 1780” by Charles Blaskowitz was believed to be the most accurate of all the maps. The second map by George Taylor, drawn in 1781 after the siege, appears to be more accurate with the modern landscape, according to the GIS overlay. Taylor was a surveyor

⁶⁹ “Home | Library of Congress,” web page, Library of Congress, Washington, D.C. 20540 USA, accessed November 23, 2020, <https://www.loc.gov/>.

⁷⁰ “William L. Clements Library Image Bank: Results (43 : 1 / 3),” accessed March 15, 2021, https://quod.lib.umich.edu/w/wcl1ic?type=boolean&view=thumbnail&rgn1=ic_all&from=index&q1=charleston&med=1.

appointed by the British engineers to survey the land and served as assistant engineer to Major Moncreif, the chief engineer of fortifications.⁷¹ Taylor came with a background in cartography and engineering. He made two maps of the Charleston peninsula. The first map was drawn during the Siege of 1780 and included a wider span of land. The second map was completed in 1781 after the siege and included new fortifications built by the British once they took control of the peninsula. However, only the second map drawn after the siege was georeferenced for this thesis. The historic accounts were compared to the historic maps to find correlations between the two sets of information.

The Charles Blaskowitz map and the George Taylor map were downloaded from different depositories. The Charles Blaskowitz map was obtained from the National Archives in the United Kingdom and the George Taylor Map was obtained from the University of Michigan Map Library online.⁷² Both maps were downloaded and moved into a separate folder to be used later in GIS. These maps were downloaded at a high resolution to be viewed clearly in the GIS program and for easy georeferencing. Aerial imagery was required as the base map for which the historic maps were overlaid in GIS. This modern map was downloaded from the National Oceanographic and Atmospheric Administration (NOAA).⁷³ The clearest maps used for this thesis were the 2003 SC Oyster Mapping 4-Band 8 Bit Imagery; the 2017 NAIP 4-Band Bit Imagery, Coastal South Carolina; and the 2019 NOAA NGS DSS Natural Color 8 Bit Imagery: Hurricane

⁷¹ Adams, I. H. 1975. "George Taylor, a Surveyor o' Pairts." *Imago Mundi* 27: 62.

⁷² "William L. Clements Library Image Bank: Plan of Charlestown 1781 / Surveyed & Drawn by George Taylor.", Blaskowitz, "A Plan of the Siege & Surrender of Charlestown..."

⁷³ "NOAA: Data Access Viewer," accessed November 23, 2020, <https://coast.noaa.gov/dataviewer/#/>.

Dorian.⁷⁴ Historic accounts of the siege were gathered from personal journals from various historical figures such as Benjamin Lincoln, William Moultrie, Henry Clinton and others. Information was also gathered from Nic Butler’s blog *The Charleston Time Machine*, and Carl Borick’s book *A Gallant Defense*.⁷⁵

The historic accounts were gathered and compared to the historic maps of the area. These maps were then put into a geographic information system (GIS) program by Esri and georeferenced with the modern landscape.⁷⁶ Georeferencing involves creating an accurate overlay of the map and modern landscape. The modern map contains coordinate data within it that lets the GIS program know where the map is placed on Earth. With this information, control points were anchored to areas on the historic map and areas on the modern landscape that remain the same today. After several control points are made, the historic map is overlaid on the modern landscape and made transparent to view the accuracy of the overlay. Depending on the accuracy of the historic map with the modern map, the transparent overlay explains where remains of battlefield features may be located today.

Based on the georeferenced Blaskowitz and Taylor maps, the streets line up almost exactly with both maps. It appears that the Taylor map streets land directly onto of the modern landscape in most places (Figure 15). Whereas the Blaskowitz map lands

⁷⁴ “NOAA: Data Access Viewer,” accessed November 23, 2020, <https://coast.noaa.gov/dataviewer/#/>.

⁷⁵ Clinton and Bulger, “Sir Henry Clinton’s ‘Journal of the Siege of Charleston, 1780.’”; Borick, *A Gallant Defense*; Moultrie, *Memiors of the American Revolution*; Benjamin Lincoln, *Original Papers Relating to the Siege of Charleston, 1780* (Press of Walker, Evans & Cogswell Company, 1898).

⁷⁶ “GIS Mapping Software, Location Intelligence & Spatial Analytics | Esri.” n.d. Accessed March 21, 2021. <https://www.esri.com/en-us/home>.

directly on top of the streets in some areas, but they are off by a small amount on some streets (Figure 14). However, the Blaskowitz and Taylor maps are very similar in their predicted spots of Charleston Streets. The accuracy of the georeferenced maps is important to placing a GPR survey grid. Above modern-day Calhoun Street, there are no anchor points to secure both maps to the landscape. However, the Taylor map lines up almost perfectly with King Street, whereas the Blaskowitz map places King Street off by a few hundred yards. The accuracy of the King Street overlay on the Taylor map means that this map is more accurate to the modern landscape, at least in its placement of King Street, which influences the placement of Battlefield features drawn on the map above Calhoun Street.

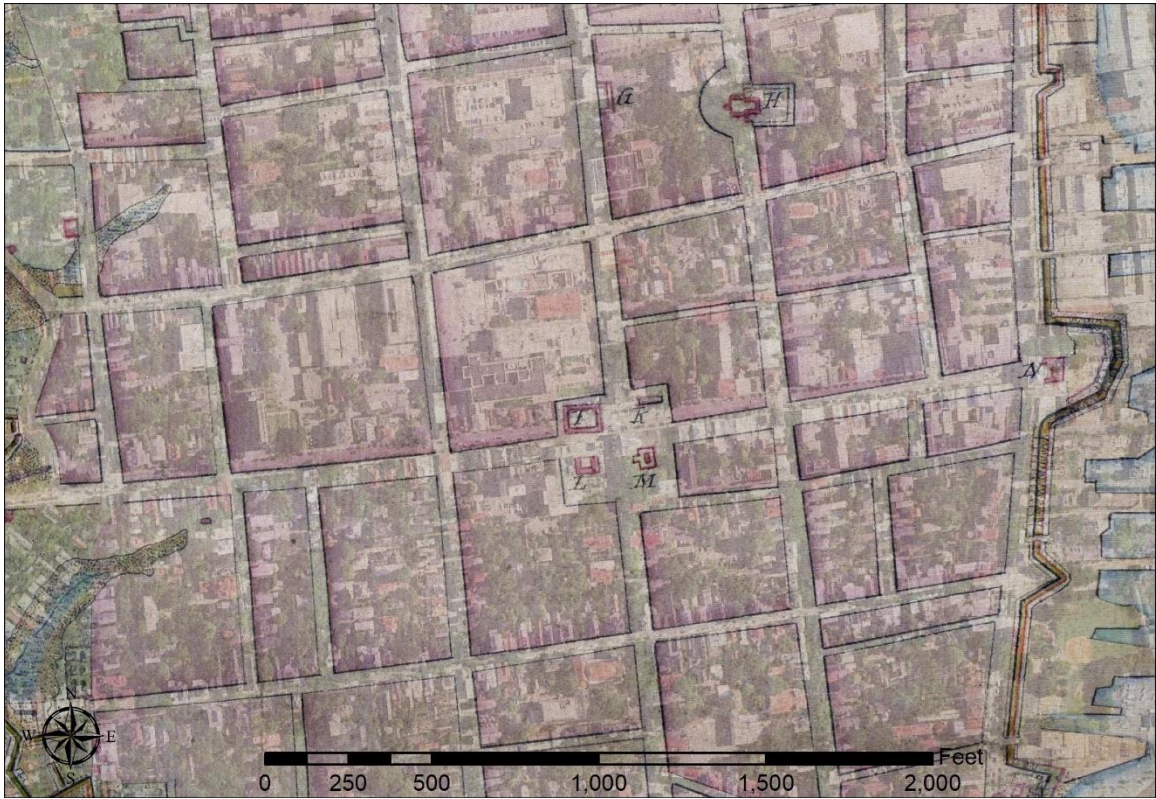


Figure 17: The Charles Blaskowitz Map 1780 overlaid with a modern aerial view of Charleston.

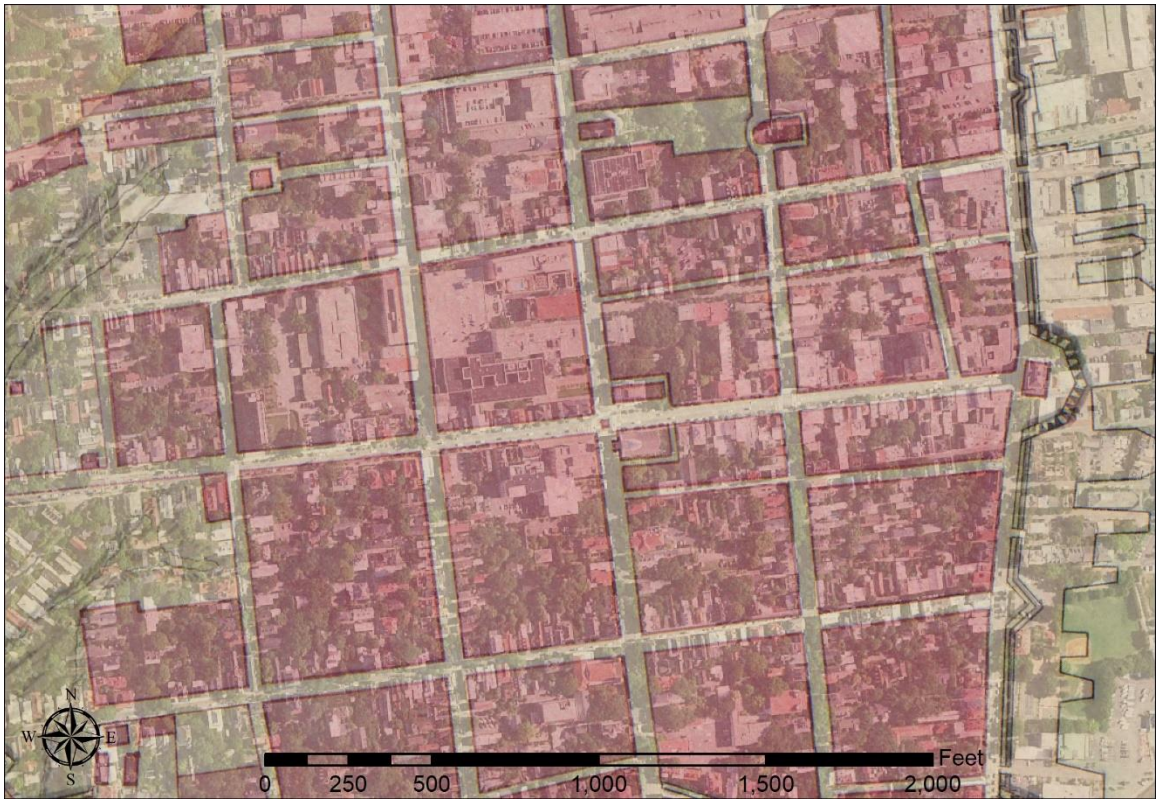


Figure 18: The George Taylor Map 1781 overlaid with a modern aerial view of Charleston.

Collection of Post-Revolutionary War Historic Maps and Plats of the Study Areas

In addition to the Blaskowitz and Taylor maps providing the location of the siege lines and defenses, other historic maps postdating the siege were gathered to understand the development on the Charleston peninsula since the Siege of 1780. These maps include Sanborn Maps to identify buildings built on site since the siege, the *Bird's Eye View of Charleston* from 1872, plats from the McCrady plat collection at the Charleston County Register of Deeds, and a plat drawn by John Diamond in 1807 located in the archives at the South Carolina Historical Society.

Past construction as indicated on the maps through time dictates whether serious changes to the area affected any historic trenches or defenses on the land. The changes to the land through time dictates if a GPR search of the area would reveal the historic trenches and defenses or if too many changes to the land destroyed any below ground evidence of the defenses and siege trenches. The process of collecting these maps included gathering the Sanborn Map collection at the Charleston County Public Library, referencing the McCrady Map Collection at the Charleston County Register of Deeds, and correspondence with the South Carolina Historical Society.⁷⁷

The historic maps and plats in the survey area were arranged into folders. Each map indicated what the changes were to the land since the siege. These areas were highlighted and written down to track the changes according to the maps and plats in the survey area. The areas on the maps that indicate significant changes to the site since the

⁷⁷ Sanborn Maps "Fire Insurance Maps Online," Charleston County Public Library, accessed December 11, 2020, <https://www.ccpl.org/fire-insurance-maps-online>.

Siege of Charleston were not included in this study because the changes most likely destroyed any remains of the siege trenches or defenses in that area. Maps and plats in the survey area that have not had any changes through time were added to the collection for further study. These areas were predicted to have the remains of defenses, trenches, or fortifications in the area.

LiDAR Data Collection

LiDAR is an acronym for Light Detection and Ranging. LiDAR imagery reveals topographic data represented by colors. The brighter the color, the higher the elevation; the darker, the color the lower the elevation. The LiDAR data was obtained by an aircraft or satellite that flew over the land with a laser array attached to the bottom. The laser sends light pulses down to the peninsula which bounce off objects and the land. When the laser returned to the aircraft the measurement of time it took to return to the aircraft provided accurate data on the height and depth of the land and objects on the land.⁷⁸

LiDAR scans of the Charleston peninsula are another tool used to locate the features associated with the American Revolution. The LiDAR scans are mainly a tool to identify the high and low spots on the land and other key landscape features to locate remnant above ground areas. These high and low spots as indicated on LiDAR explained if waterways and marshes drawn on the Blaskowitz and Taylor maps are still in the same place today. These high and low spots on the map also serve as a basis to understand where troops on either side likely placed fortifications or features such as siege trenches

⁷⁸ National Oceanic and Atmospheric Administration US Department of Commerce, "What Is LIDAR," accessed December 10, 2020, <https://oceanservice.noaa.gov/facts/lidar.html>.

and defensive walls. The topographic data was compared to surface features located on the Blaskowitz and Taylor maps, and areas were chosen for further study. The LiDAR data used for this study was gathered in 2017 by NOAA satellites.⁷⁹ LiDAR data is obtained and downloaded from NOAA.⁸⁰ The LiDAR information uses the same transformation data as the modern landscape maps and therefore were automatically georeferenced with the historic maps. Several LiDAR scans were collected from each site to get a closer look at each area of interest. The areas selected to view were: one scan of the entire peninsula, and several smaller areas in the study areas for a detailed look.

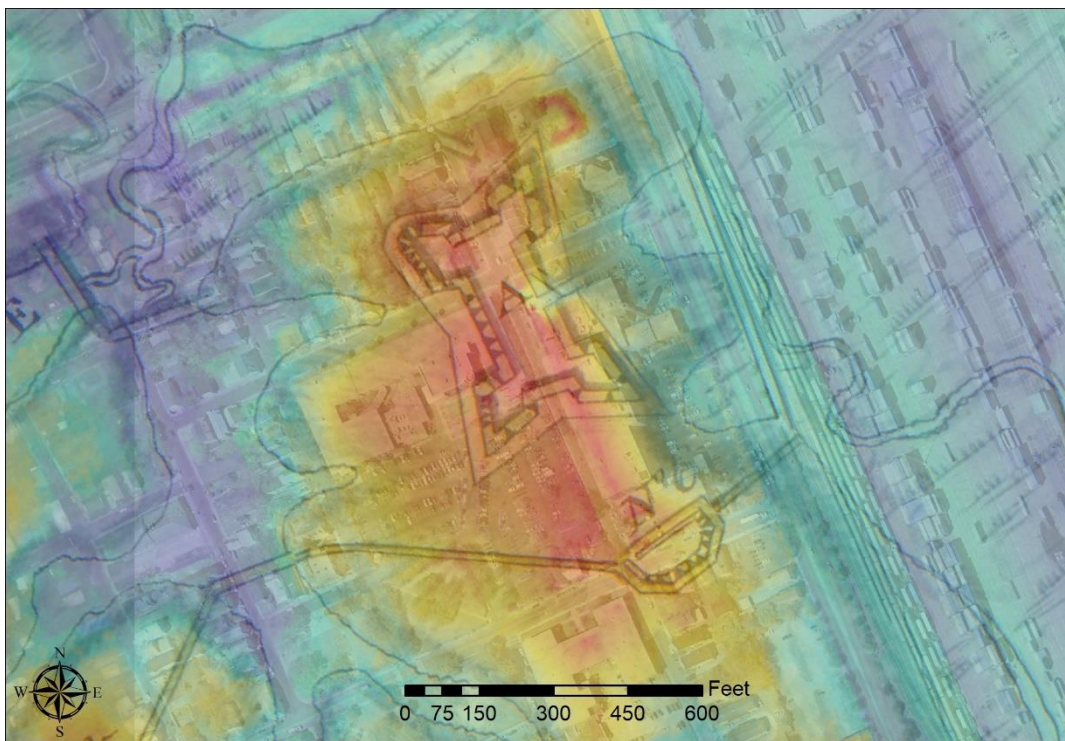


Figure 19: LiDAR view and Taylor map overlaid with an aerial view of Hampstead Hill.

⁷⁹ “NOAA: Data Access Viewer,” accessed November 23, 2020, <https://coast.noaa.gov/dataviewer/#/>.

⁸⁰ “NOAA: Data Access Viewer,” accessed November 23, 2020, <https://coast.noaa.gov/dataviewer/#/>.

The data analysis of the LiDAR scan from the study areas explained where the historic maps correlate to the modern topography on the landscape. These areas show if the areas remain in high or low spots as originally indicated by waterways or marshes on the historic Blaskowitz and Taylor maps. The study areas selected all showed that they are on high ground or surrounded by a creek or water way. Historically, troops would place a siege trench or a defense line on high ground. Based on the LiDAR information gathered, the areas of study are still on high ground. High ground is important in locating the siege trenches and defense lines because if the LiDAR imagery showed low ground where the historic maps show high ground, this means the land has changed drastically since the siege and a probability of historic features remaining is low.

GPR Data Collection

Based on the georeference of the historic maps with the modern landscape, areas are selected for a GPR survey. The main goal of the GPR study is to find anomalies in the ground that are either in the form of a solid, such as a fortification, earthen embankment, ditch, or a trench feature. Ground penetrating radar (GPR) survey gathers and maps radar data through scans of the ground. The GPR device used for this study is a GSSI with a 350 MHz (megahertz) antenna. The radar pulse sends a signal through the ground and measures the amount of time it takes for the signal to return to the antenna.⁸¹ The measure of time that it takes for the radar signal to hit an object and return to the antenna signifies the depth of the anomaly. Changes in the soil are also detected by the radar

⁸¹ “What Is GPR: A Brief Description by GSSI,” GSSI Geophysical Survey Systems, Inc., accessed December 11, 2020, <https://www.geophysical.com/whatisgpr>.

signal. To begin the GPR survey, a perimeter is set up in the study area, running over the suspected feature. Then, two foot transects were chosen along the baselines to run the GPR across the ground. The GPR consists of a box on wheels containing the antenna that projects the radar signal into the ground. The box is connected via its own Wi-Fi to transport the data to a small viewing screen. The viewing screen shows what the radar is picking up in a profile of the ground. The antenna on the GPR projects a radar signal through the ground, creating profiles of the ground. The GPR bounces off the anomaly in the ground and detects disturbances in the soil where a solid fortification remains or where a ditch was filled in. These profiles of the ground explain where the ground was disturbed, explaining if a trench was filled in. This process was repeated at each area selected for study.

The GPR data was processed using proprietary software made by GSSI called Radan 7. The data was viewed in two ways, profile view and plan view. The profile view shows disturbances in the soil. The disturbances in the soil show up as changes in the soil stratigraphy. These changes are indicated by light and dark bands. If there is no disturbance, there are fewer viewable bands of soil. If there is a disturbance, the area shows up with highly reflective bands of soil. If an area is located indicating a filled-in trench, the historic trench will show up in the shape of a “V” indicating a ditch once used as a defense. The software pinpoints the coordinates of the plan view. This is done by notating the number of transects the disturbance is located on and multiplying that by two feet, which is the width of the transect. Once areas are found on the GPR scan, they are saved for study. The horizontal views of the ground at different depths are viewed by

moving the cursor over the map while holding down “control”, or by clicking a button on the menu indicating the depth of the scan. Each layer contains information which shows an anomaly or lack of an anomaly. This plan view was the basis of the GIS overlay onto the land in GIS, which gives a visual representation of where the anomaly is located on the land. Once the data was processed, the areas with anomalies were written down. A screen shot was taken of the plan view of the survey after processing was finished. This screen shot image was then taken into GIS and georeferenced onto the modern landscape. This was done by measuring out the distance of the survey area on GIS based on the distance taken at the time of the survey. Once the GPR plan view scan was overlaid onto the modern landscape, then we had a visual representative of where the fortification or siege trenches were once located.

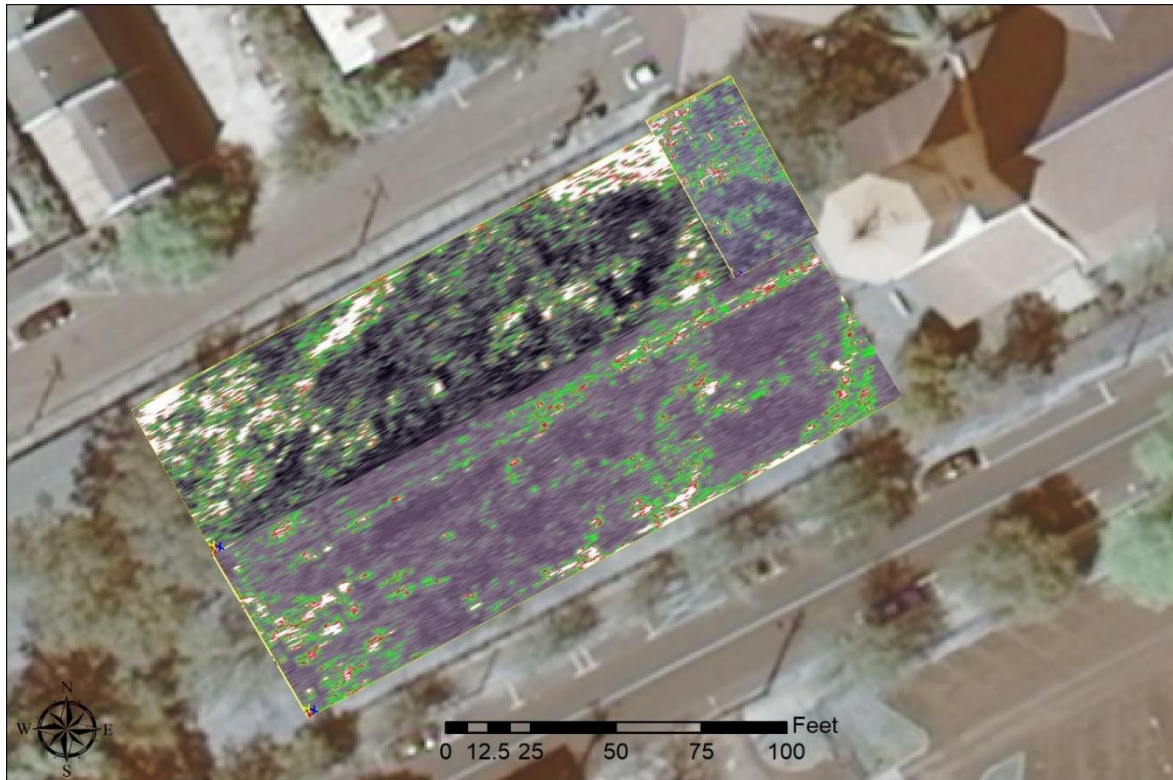


Figure 20: Plan view of Wragg Square GPR survey results.

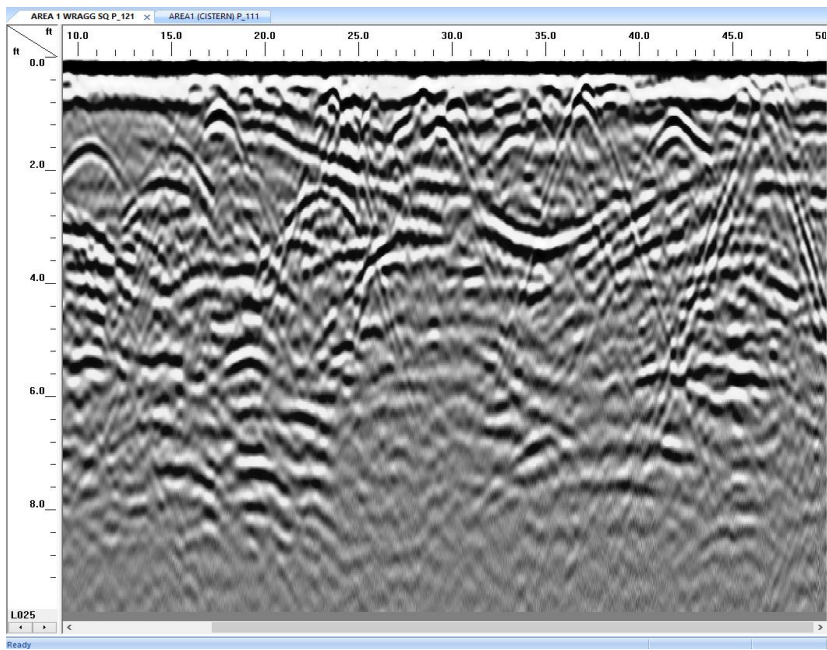


Figure 21: Profile view of Wragg Square GPR transects.

Conclusion

These methods provided a prediction on where the revolutionary war defenses and siege lines were located. The georeference of the historic maps is the basis for GPR survey of the revolutionary war era defenses and siege trenches. The data collection to look for the historic revolutionary war fortifications began with the geo-referencing of the Blaskowitz and the Taylor maps. From there, the LiDAR scan to find high areas showed the likely places troops would have built defenses or dug trenches. The GPR scan of the ground provides a picture of possible remnant features. These areas that were picked up by GPR give future archaeologists areas to conduct archaeological digs to prove the existence of what was seen on GPR.

CHAPTER FOUR: DATA ANALYSIS

The data analysis on the Revolutionary War fortifications on the Charleston peninsula reveal compelling results. The survey areas investigated using GPR included a search for the siege trenches that the British utilized to complete their siege of the city, the American defense line built from the Cooper River to the Ashley River, the hornwork in Marion Square meant to defend the city from a British attack, and the foundation of a barracks complex. Each survey area was located through consultation of historic accounts, historic maps which were georeferenced on the modern landscape which laid a basis for the GPR survey, LiDAR to characterize the topography of the landscape, and then finally ground penetrating radar. In some areas, GPR provided support for the location of the features, in other areas it did not. This chapter provides the results of the study and is organized by survey area. Each survey area provided different findings. The techniques utilized to locate these areas all worked together to provide a plan for the final GPR survey. In the end, ground penetrating radar provided conclusive information to the location of a few areas, whereas archaeology would be needed to date each site.

Hampstead Hill Historic Accounts

Hampstead Hill on the east side of the Charleston peninsula was a key area for the Siege of Charleston. Today, the area is a neighborhood called Hampstead Village which consists of houses, a Cigar Factory which was a textile mill in the late nineteenth century, the campus for Trident Technical College, and a few restaurants.⁸² The survey areas on

⁸² “Cigar Factory Strike – Charleston Justice Journey,” accessed January 14, 2021, <https://charlestonjusticejourney.org/locations/cigar-factory-strike/>.

Hampstead Hill are in the parking lot of Trident Technical College, and the parking lot of the Cigar Factory (Figures 17 & 18). The parking lot of Trident Technical College used have houses located in the area before the college was built. The parking lot is bounded by Columbus Street to the south, Drake Street to the east, and America Street to the west. The Cigar Factory parking lot is located on the Cooper River side of the peninsula and is bounded by Drake Street to the west, Columbus Street to the south, and East Bay Street to the east.

The historic accounts of the Siege of Charleston in 1780 are best described through British, Hessian, and American journals. According to these personal accounts, General Henry Clinton oversaw the building of the redoubts and the communication trenches between each redoubt.⁸³ These trenches were meant to conceal soldiers as they traveled between redoubts. In General Henry Clinton's journal of the Siege of Charleston he mentions the hill he sees when he first begins to enter the peninsula.⁸⁴ In his journal dated April of 1780, he states, "I went to the left on the island, saw rising ground near the town, which appeared not above 800 yards from it. It may cost to get it, but when in possession of it we take the town."⁸⁵ He was referring to the natural bluff on Hampstead Hill.⁸⁶ Clinton refers to the hill several more times as he discusses the defensive nature of the battery and the communication trenches leading there.⁸⁷ Three other historic accounts also describe the construction of the battery on Hampstead Hill. General

⁸³ Clinton and Bulger, "Sir Henry Clinton's 'Journal of the Siege of Charleston, 1780'", 149-70.

⁸⁴ Clinton and Bulger, "Sir Henry Clinton's 'Journal of the Siege of Charleston, 1780'", 149.

⁸⁵ Clinton and Bulger, "Sir Henry Clinton's 'Journal of the Siege of Charleston, 1780'", 149.

⁸⁶ Clinton and Bulger, "Sir Henry Clinton's 'Journal of the Siege of Charleston, 1780.'", 149, Borick, *A Gallant Defense*, 122.

⁸⁷ Clinton and Bulger, "Sir Henry Clinton's 'Journal of the Siege of Charleston, 1780'", 149.

Moultrie speaks of the battery's construction on the hill, and John Wilson's journals all speak of the construction of the key defensive position for the British.⁸⁸ A Hessian soldier also recounts the construction of the battery on Hampstead Hill and an attempted attack from the Americans from ships on Town Creek.⁸⁹

Hampstead Hill is on a natural rise on the peninsula right on the Cooper River - a strategic position to place a battery and to run communication lines. This area was also a portion of the first parallel. Running west from Hampstead Hill was the rest of the first parallel which ran from the Cooper River to the Ashley River with redoubts along the way.⁹⁰ The historic accounts of the battery on Hampstead Hill and the approach trench place it in the vicinity of the modern-day Hampstead Village portion of the Charleston peninsula. These historic accounts provide further materials consistent with historic maps.

Hampstead Hill Historic Maps and GIS

The historic accounts are consistent with the georeferenced Blaskowitz and Taylor maps and provide an indication of where to lay the survey area for a GPR study (Figures 17 and 18). On the georeferenced Blaskowitz map (Figure 17), the redoubt referred to in the historic accounts crosses modern-day East Bay Street and runs east-west across the middle of the Cigar Factory parking lot. In the georeferenced Taylor map, the

⁸⁸ Moultrie, *Memoirs of the American Revolution*, 20 and 62, Wilson and Waring, "Lieutenant John Wilson's 'Journal of the Siege of Charleston'", 179.

⁸⁹ Johann Ewald, *Ewalds DIARY OF THE AMERICAN WAR*, accessed January 13, 2021, 224. <http://archive.org/details/EwaldsDIARYOFTHEAMERICANWAR>.

⁹⁰ Butler, Nic "Hampstead Village: The Historic Heart of Charleston's East Side," Charleston County Public Library, October 18, 2019, <https://www.ccpl.org/charleston-time-machine/hampstead-village-historic-heart-charlestons-east-side>.

redoubt is to the south of the Cigar Factory on Columbus Street, with a portion of the first parallel crossing the south portion of the Trident Technical College parking lot (Figure 18). In addition to the battery on Hampstead Hill, the British placed a fortification on the hill a little to the north of the battery after the siege (Figure 18). The fortification is seen on two different maps, the George Taylor map and the Scavenius map of Charles Town. The Taylor map places the fortification, erected by the British, right on top of Hampstead Hill just to the north of the battery placed before the siege. The georeferenced map of the area places the fortification, on the Taylor map, in the vicinity of the Trident Technical college (Palmer Campus) parking lot, the intersection of Drake and Blake Streets, with a portion of the north bastion in the vicinity of the city incinerator. The georeferenced maps are consistent with the historic accounts of the siege, by placing the two works on top of Hampstead Hill in the vicinity of the modern-day Cigar Factory and the Trident Technical College parking lot.

In order to assess the likelihood that portions of the fortifications survive intact, one must review the alterations made to the land since the siege of Charles Town in May of 1780. The George Taylor map from 1781 and the Scavenius map (undated), both place a fortification on top of Hampstead Hill in addition to the battery that was used during the siege.⁹¹ The fortification is complete with bastions and redans and meant to defend the city from attack after the British took control. *The Bird's Eye View of Charleston* done in 1872 shows how much this area of the peninsula changed in the ninety-two years since

⁹¹ Taylor, "Plan of Charlestown 1781 / Surveyed & Drawn by George Taylor."; "Scavenius Map of Charles Town."

the American Revolution (Figure 19).⁹² A few buildings stood on the site in 1872 according to the *Bird's Eye View of Charleston*, ninety-two years after the siege of Charleston.⁹³ The Sanborn maps dating from 1888 to 1952 signify significant changes to Hampstead Hill.⁹⁴ The area bounded by Drake and Columbus Streets, known as the Trident Technical College Palmer Campus parking lot, saw several changes with houses through the years. However, there is one area in the parking lot that seems to have remained untouched since the American Revolution. All the Sanborn Maps and the aerial imagery from the USC imagery database show no alterations to this little piece of land (Figure 28).⁹⁵ This area is prime for further research into evidence of a siege trench. The survey area is in the southern portion of the parking lot, with Hampstead Park to the west, and Columbus Street to the south. However, the Blaskowitz map also places a siege trench in the parking lot of the Cigar Factory, indicating that the trench could be located here as well (Figure 23).

⁹² Drie, "Bird's Eye View of the City of Charleston South Carolina 1872 / C. Drie, Lithographer."

⁹³ Drie, "Bird's Eye View of the City of Charleston South Carolina 1872 / C. Drie, Lithographer."

⁹⁴

⁹⁵ "University of South Carolina University Libraries," accessed March 15, 2021, <https://delphi.tcl.sc.edu/library/aerialphotos/>.

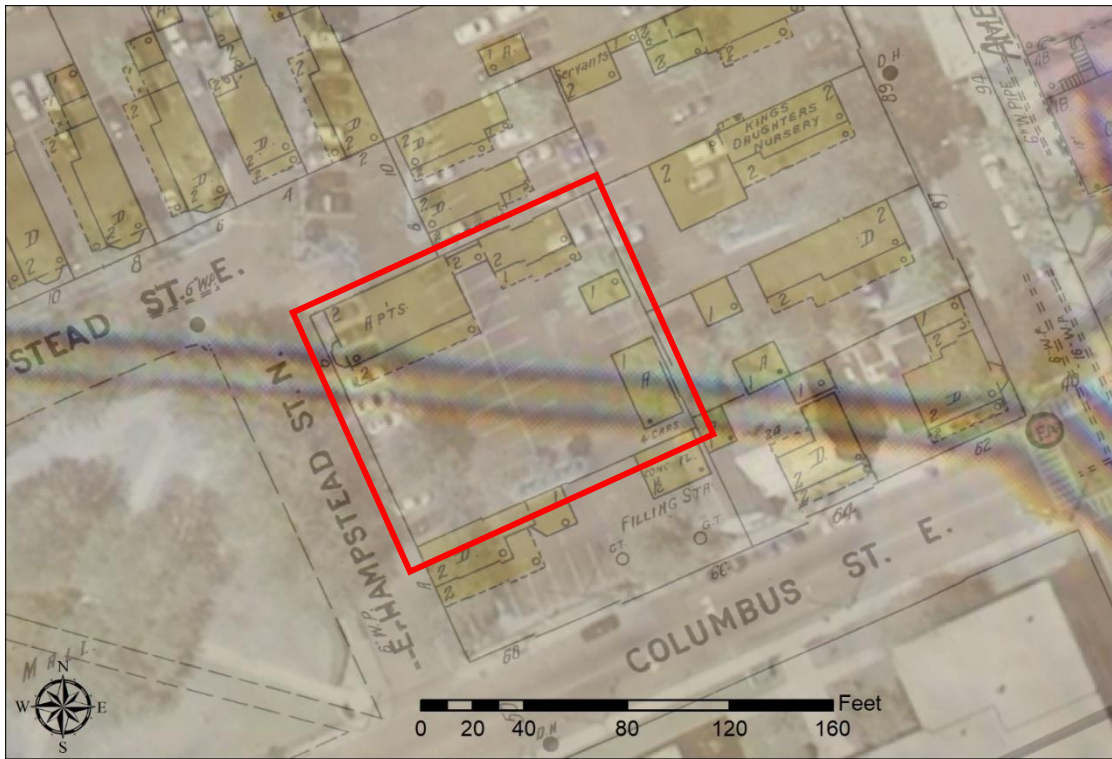


Figure 22: Survey area of Trident Technical College Parking lot, overlaid with the Taylor Map and the 1951 Sanborn Map, red box indicates the



Figure 23: The Cigar Factory parking lot overlaid with the Sanborn map of 1951 and the Blaskowitz Map of 1780; red box indicates the survey area.

According to the history of the Cigar Factory, it was constructed on the site as a textile mill in 1882, but the first Sanborn Map indicating the structure, was drawn in 1888.⁹⁶ By 1902, a cotton storage shed appeared on the east side of the current day parking lot fronting East Bay Street. In 1957 there was a curved concrete platform curving from East Bay Street to the former elevator shaft and a coal pit. The train tracks went to the center of the parking lot, most likely to deliver goods to the factory.

According to the georeferenced Taylor Map (Figure 18), portions of the parking lot were

⁹⁶ *Sanborn Fire Insurance Maps* (Charleston, SC, 1888), Plate 24, https://fims-historicalinfo-com.copl.idm.oclc.org/FIMSSD.aspx?m=08124_1888.

once marsh and were filled in when they expanded the peninsula. The building built as a storage shed in the eastern part of the parking lot also would have caused land altering activities in order to build a foundation.



Figure 24: The georeferenced Taylor Map with the Cigar Factory Parking lot.

The georeferenced maps provide a survey area for a GPR study. The first study area was of the modern-day Cigar Factory parking lot to see if the georeferenced Blaskowitz map prediction of the first parallel was there (Figure 25). The second GPR survey was located in the parking lot of Trident Technical College in a small area that appears to have had no major building campaigns through the years. The area of the fortification is not being surveyed since too many changes happened to the area around

the fort since the siege. Based on the historic maps, it is clear that land altering activities have happened to the area since the siege.

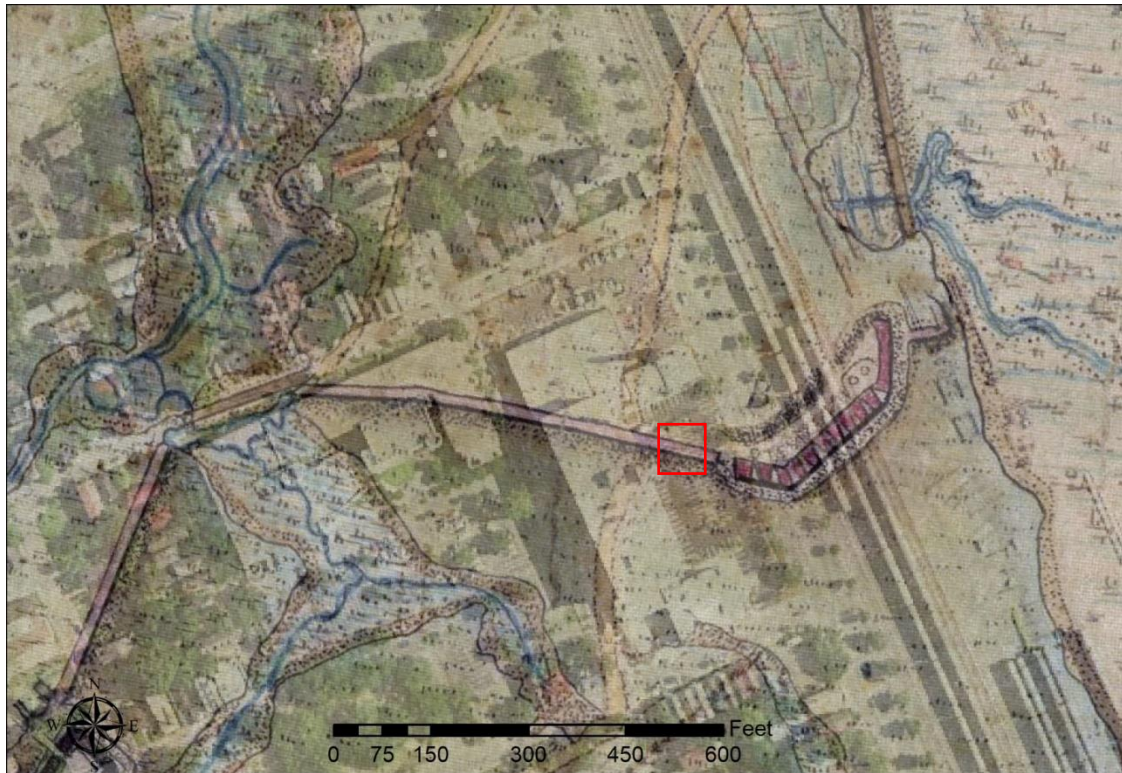


Figure 25: *Charles Blaskowitz Map 1780* overlaid with the modern landscape over the modern-day Cigar Factory.



Figure 26: *George Taylor Map Plan of Charles Town 1781* – Overlaid with a modern aerial photograph. Survey areas outlined in red.



Figure 27: The Bird's Eye View of Charleston 1872: Hampstead Hill in 1872, showing little changes to the area since the revolution.

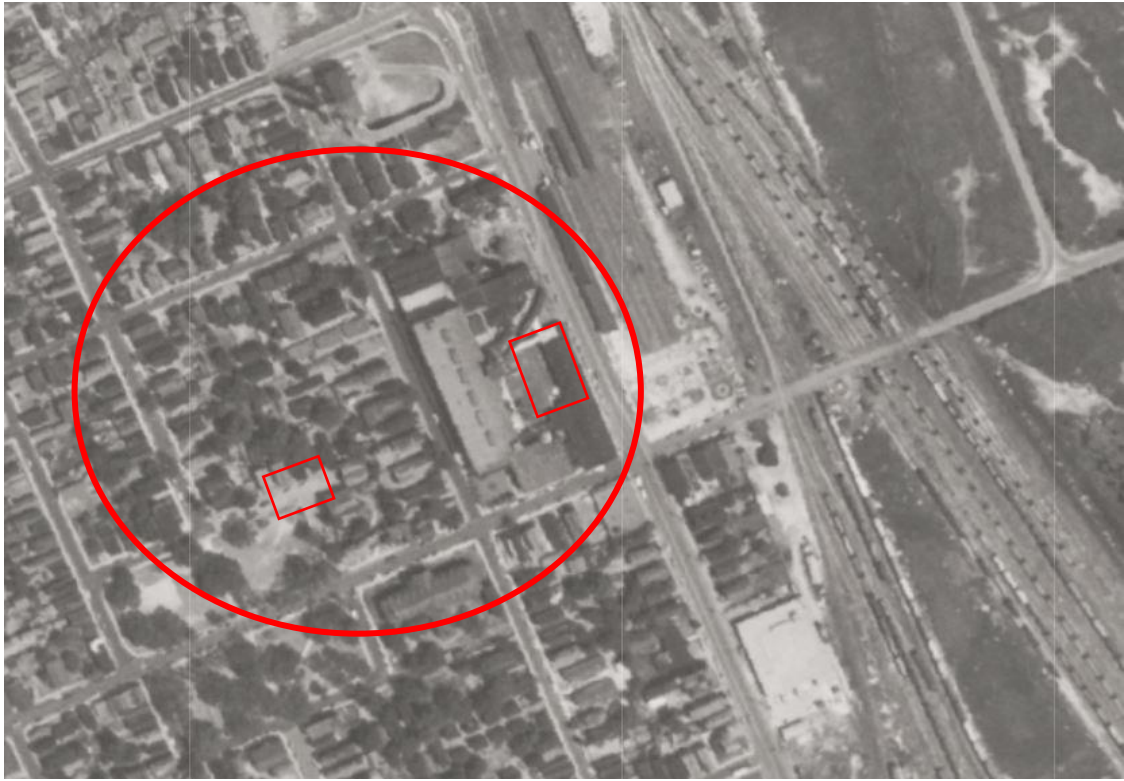


Figure 28: 1954 Aerial Imagery of Hampstead Hill. University of South Carolina Ariel Imagery Library. Highlighted areas are areas where the GPR survey is taking place.

Hampstead Hill LiDAR Results

The georeferenced historic maps provide a visual representation of where the fortifications and trenches are located on the peninsula today. However, military features are usually placed on high ground, unless a feature such as a moat took advantage of the low ground, therefore a LiDAR scan of the area is necessary to see the topography of the land (Figure 21). The LiDAR provides another piece of evidence for how well the georeferenced maps correlate with the modern landscape. If the topography showing low and high spots on the modern landscape line up with the historic waterlines on the georeferenced historic maps, the location of battlefield features is more accurate.

The area of Hampstead Hill remains natural high ground according to LiDAR imagery from NOAA (Figure 21). The high ground is signified by the red area on the map indicating high elevation. Once the Taylor and Blaskowitz maps were overlaid with the LiDAR imagery, the water lines drawn on the map lined up well with the low areas seen on the modern-day LiDAR scan (Figure 22 and 23). On the Taylor map, the fortification on Hampstead Hill sits directly on top of the high ground seen on the LiDAR imagery (Figure 23). The battery on the Taylor map also sits on the high ground in alignment with the LiDAR scan. Today, Columbus Street is a low area and is consistently seen on the LiDAR scan as a low area, also consistent on the Blaskowitz and Taylor maps as a low area. The results of the LiDAR scan suggest that the topography has not changed drastically since the battle. The results of the LiDAR scan provided enough evidence for a GPR survey.

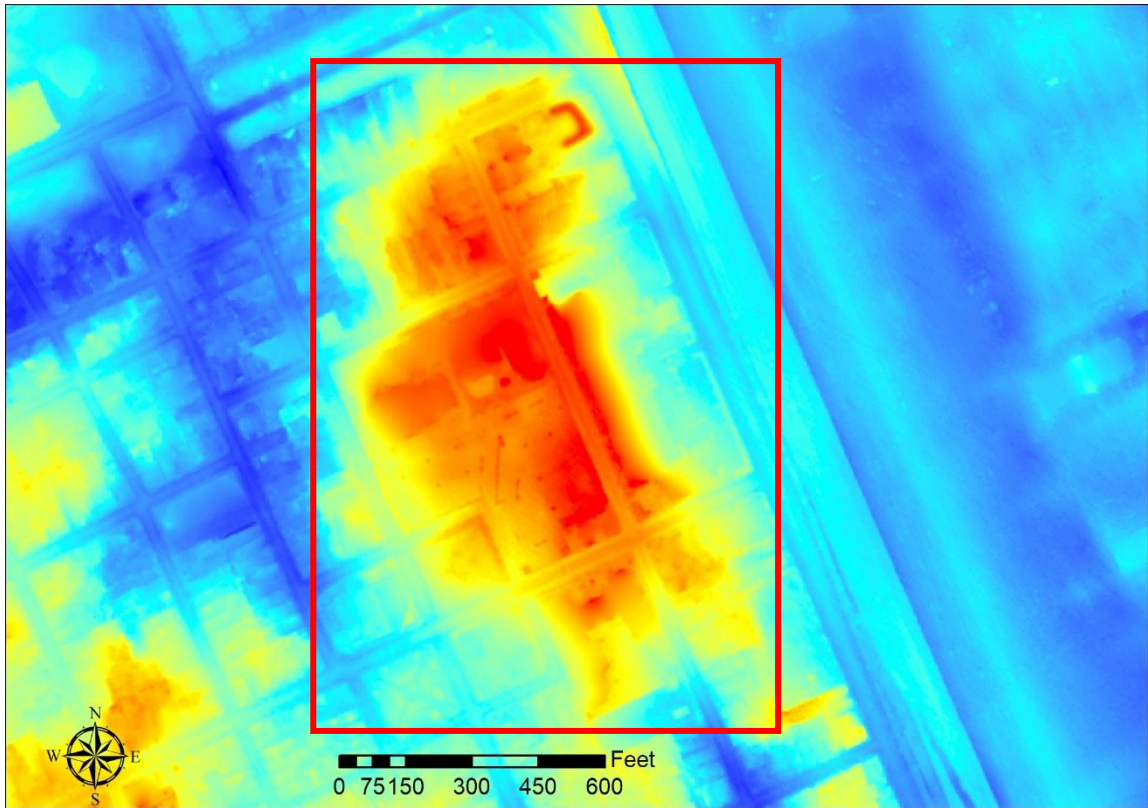


Figure 29: Hampstead Hill as seen on LiDAR.

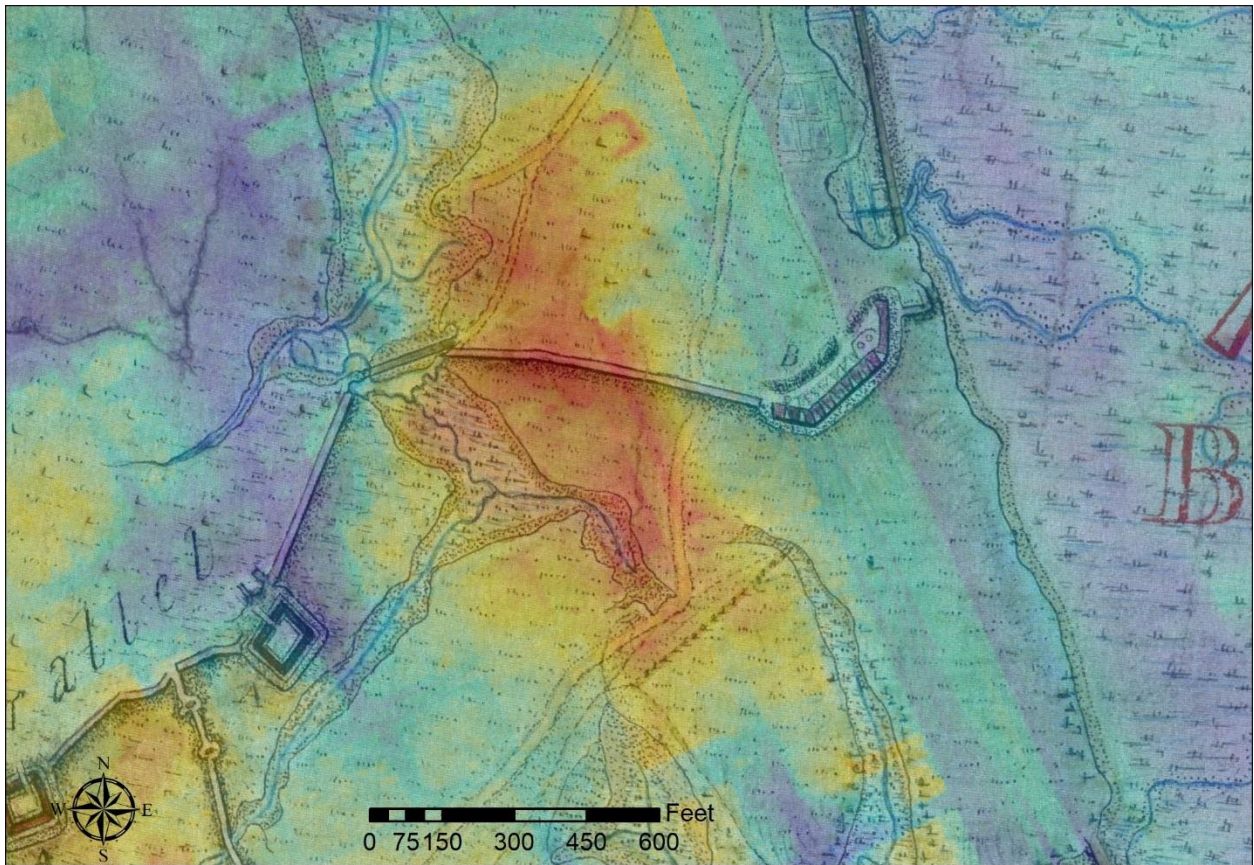


Figure 30: Hampstead Hill LiDAR with Blaskowitz map overlay.

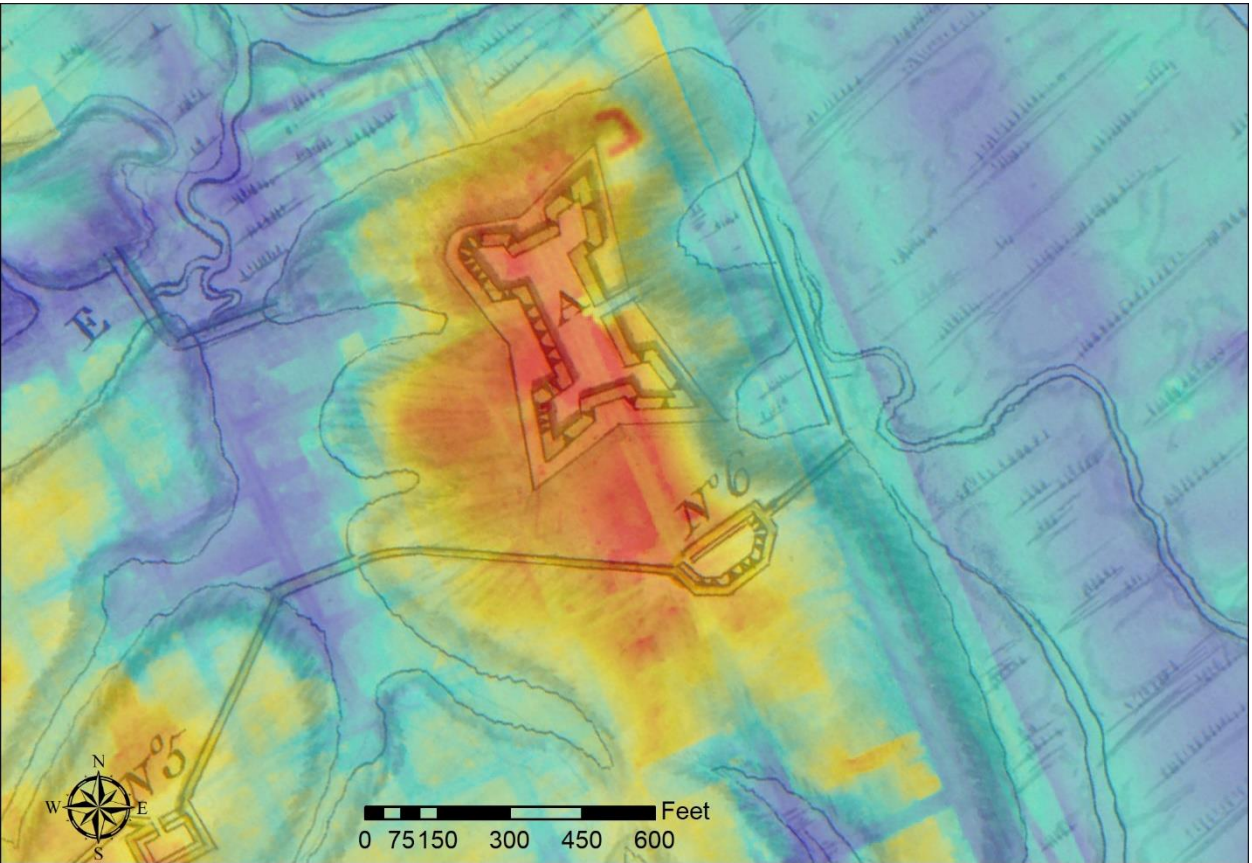


Figure 31: Hampsted Hill LiDAR with George Taylor map overlay.

Hampstead Hill Cigar Factory Parking Lot GPR Survey Results

The GPR survey of Hampstead Hill included three survey areas. Two of the three areas included the parking lot of the Cigar Factory on East Bay Street, closest to the Cooper River. Based on the georeferenced Blaskowitz map, a trench created during the Siege of Charleston in 1780 may have run directly through the Cigar Factory parking lot. The trench was dug to accommodate the battery placed on Hampstead Hill. However, LiDAR imagery of Hampstead Hill placed the parking lot of the Cigar Factory outside of the area of high elevation indicated by red on the LiDAR imagery. The west side of the parking lot once held a cotton storage building that ran from the Columbus Street side to the exit in the northern portion of the parking lot. The presence of this building probably impacted the survey results, although the front façade (or the west side of the building) only protruded out to the center of the second survey area.

The GPR survey was conducted in the early morning hours when the parking lot was empty, so no cars would be in the way of the survey area. There were two survey areas, one to the east and another to the west of the central median in the parking lot. Both areas were one hundred, twenty-three feet north-south, and thirty feet east-west.

The results of the GPR survey of the Hampstead Hill Cigar Factory parking lot revealed results inconclusive with a siege trench. Seen in the plan view on the west side of the parking lot at two feet, an area of high reflectivity was revealed. This area of high reflectivity is consistent with a utility line and not considered historic to the siege (Figure 33). In the eastern portion of the parking lot, there were two features seen in plan view at

two feet below the surface (Figure 32 and Figure 34). Feature one in area two (Figure 32 and 34) is approximately forty feet long and twenty feet wide by almost eight feet deep. Feature one is indicated by multiple high amplitude point-source reflection hyperbolas. The filled-in area is in the shape of a rough “U.” The feature runs in a diagonal throughout the survey area beginning in the far southeast corner and running diagonally to the middle of the survey area on the western side. The multiple high amplitude point-source reflection hyperbolas indicate that this area was filled in over time, indicated by fill episodes. Based on the Taylor map, this area could be a former tidal creek, filled in to expand the peninsula (Figure 24). Feature two is just to the north of feature one and is another area of fill. The fill episodes are indicated by multiple high amplitude point-source reflection hyperbolas. Feature two (Figure 34) begins around fifty feet south into the survey area and ends at the north west corner of the survey area. The feature is about fifty feet long and runs north fifty feet to the edge of the survey area. This feature is around eight feet deep and roughly ten feet wide, varying in widths.

Feature 1

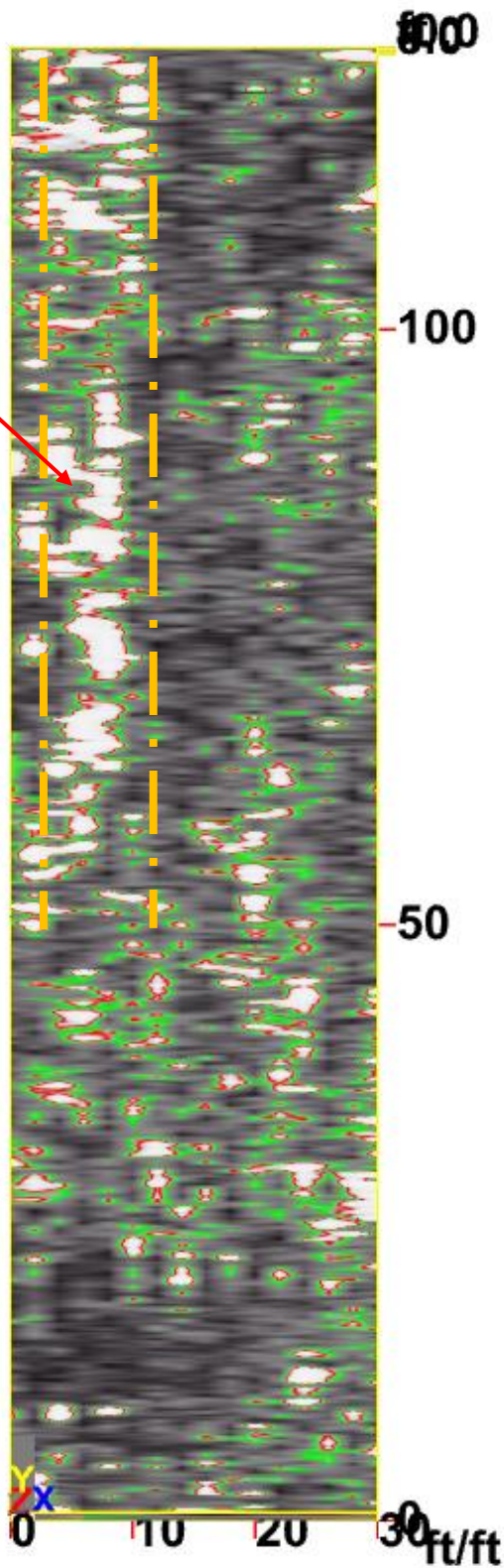
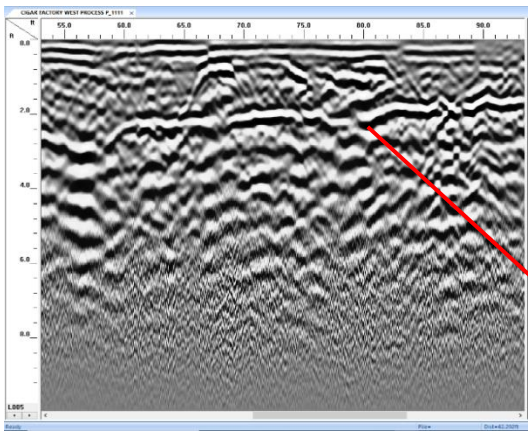


Figure 32: Area 1 plan view at 2 feet: Cigar Factory West showing a utility pipe.

Feature 1

Feature 2

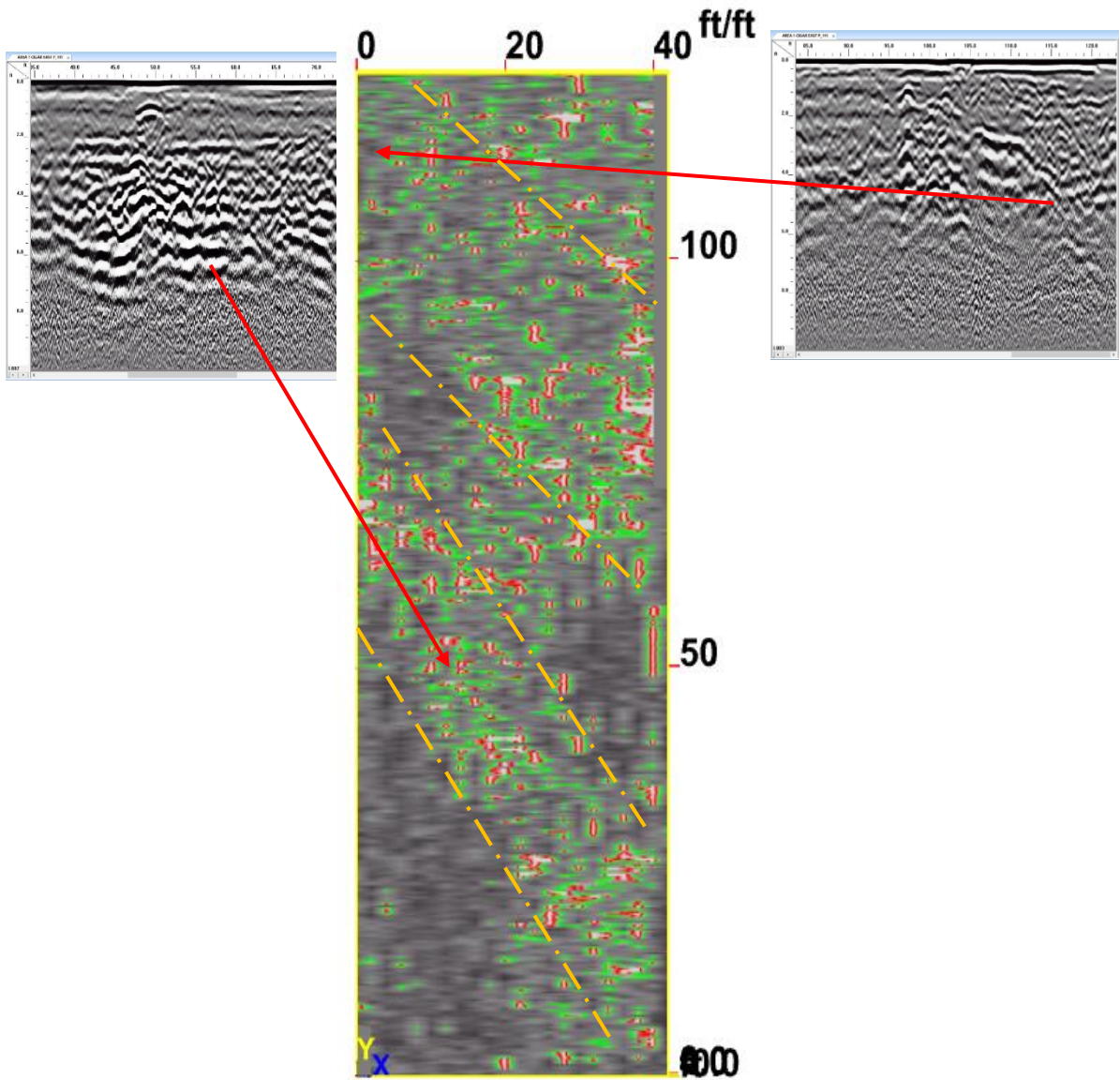


Figure 33: Plan view of area 2 at 2 feet below the surface showing the Cigar Factory Parking Lot East of Central Medium.

Hampstead Hill Trident Tech Parking Lot GPR Survey Results

Figure 34 represents the GPR scan plan view at two feet below the surface of the southern portion of the parking lot of Trident Technical College. The GPR identified two features in this area. One feature is a utility line that runs to the parking lot right in the middle of the survey grid. The other feature is an area that runs diagonally through the survey grid. The diagonal area of feature one is an area of high reflectivity as evidenced by the green, red, and white diagonal line that runs from southeast to northwest, ending at another area of high reflectivity in the northwest portion of the survey grid. The amplitude of the diagonal area that runs from southeast to northwest is higher than the surrounding area, indicating evidence of a different type of material than the surrounding soil, such as brick rubble. The strong contrast from the surrounding area is an identifying feature that aids in locating historic features below the ground.

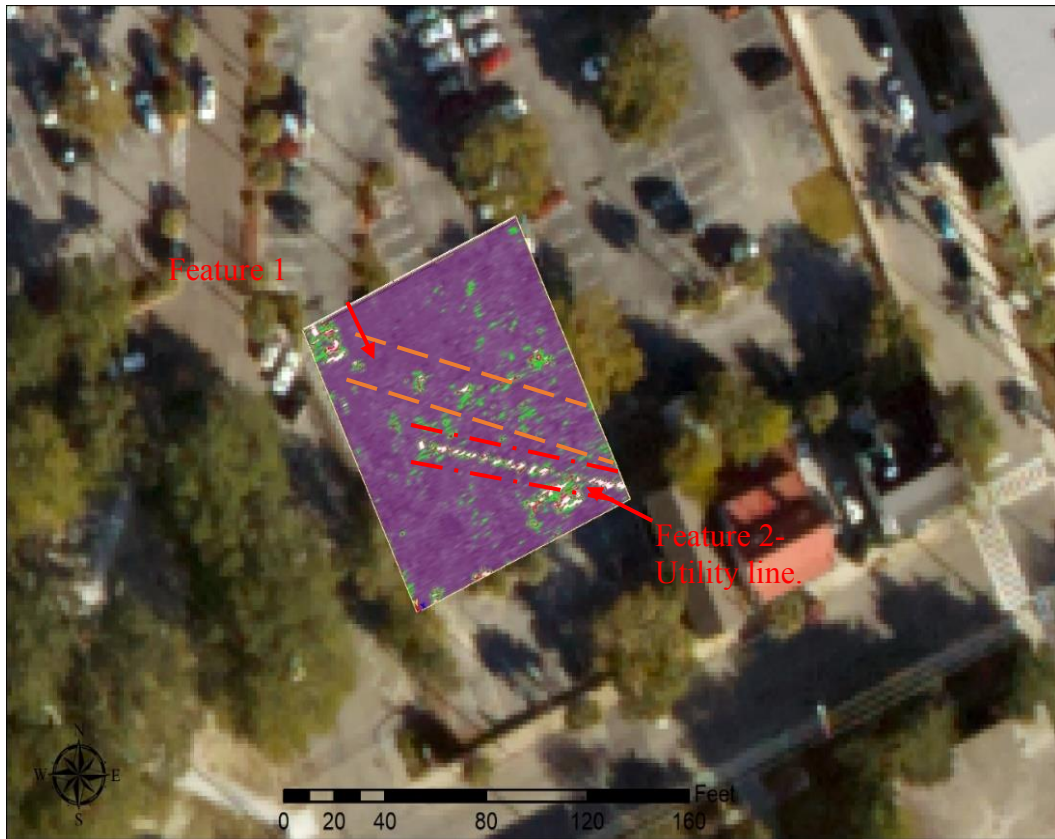


Figure 34: GPR survey area plan view, at 2 feet below Trident Parking Lot.

The profile view, or section view, is a vertical slice through the ground (Figure 35). If there are any features in the ground, they will appear in the form of a trench or brick rubble. The results of the survey indicated one area (Feature 1) with flat or undulating planar reflections, which represent a flat object (which indicates a flat lined object like a cistern). The undulating planar reflection is ten feet wide and runs one hundred feet southeast to northwest. There were multiple high amplitude undulating

planar reflections, indicating an area filled with a flat object. The flat area is two to four feet thick, according to the profile view of the GPR scan.

The areas on Hampstead Hill, which included the Cigar Factory parking lot and the Trident Technical College parking lot did not reveal results consistent with a defensive trench. The Cigar Factory GPR results revealed areas of fill, but these areas would need further archaeological excavation to determine their origin. The same can be said about the Trident Technical College parking lot. The flat areas seen on GPR are not consistent with a defensive type of trench, and therefore would need further archaeological investigations to determine historic use.

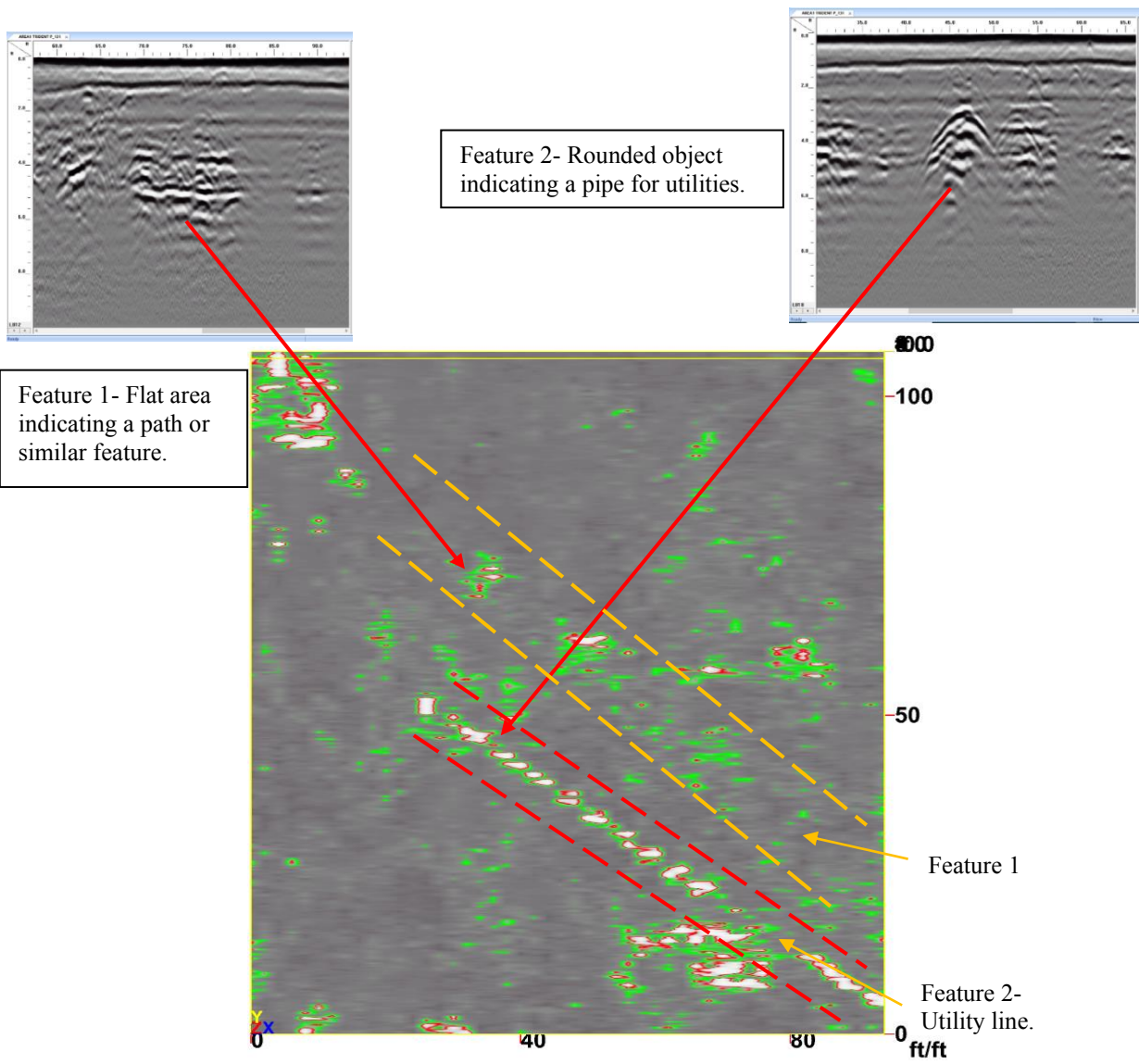


Figure 35: Plan view at 2 feet below Trident Technical College Parking Lot.

Wragg Mall Historic Accounts

The area of Wragg Mall is in the modern-day Wraggsborough neighborhood. It is bounded by Ann Street to the south, Elizabeth Street to the east, Wragg Square Street to the north, and Meeting Street to the west. Wragg Mall was established after the Siege of Charleston, therefore no specific historic accounts place the third parallel in Wragg Mall. However, there is an historic account from General Clinton mentioning guns mounted in the third parallel given its proximity to the American Defense line.⁹⁷ As discussed below, the historic account of the guns mounted in the third parallel line up with the final georeferenced Blaskowitz and Taylor maps, placing the parallel and a gun battery in Wragg Mall. The consistency of the georeferenced maps placing the gun battery in Wragg Mall and the journal of Henry Clinton mentioning guns in the third battery means that there is a good chance the third parallel was once located here. These minor historic accounts, which do not mention Wragg Mall by name, lead to clues for the next set of data, the historic maps.

Wragg Mall Historic Maps and GIS

The area of Wragg Mall was once owned by the Wragg family. It is speculated that the Wragg family sold the area of Wragg Mall to the city in the late eighteenth to early nineteenth century because it had a trench in the middle of it from the siege, making it uninhabitable.⁹⁸ Since it was sold to the city, it has remained a city park. The

⁹⁷ Clinton and Bulger, “Sir Henry Clinton’s ‘Journal of the Siege of Charleston, 1780.’”, 168.

⁹⁸ Borick et al., *Searching for the 1780 Siege of Charleston: History, Archaeology and Remote Sensing*, 104.

Blaskowitz map places the third parallel within the park, and a gun battery to the northeast of the park (Figure 36).⁹⁹ The Taylor map also places the third parallel within the park and the gun battery to the northeast corner of the park as well (Figure 38).¹⁰⁰ The parallel runs within the park southwest across the park and exits all the way to the southwest corner of the park in approximately the same area on both maps. Both maps depict gun placements within the trench in Wragg Mall as described in the historic account by General Clinton.

Aside from the Blaskowitz and Taylor maps, the Purcell plat from 1801 also shows Wragg Mall as a public park. The Purcell plat was one of the first plats used to plan out the neighborhood of Wraggsborough. On the map you can see the tidal creeks and dams which are also depicted on both the Taylor and Blaskowitz maps. The proximity of the dams to the third parallel provides further evidence for the location of the trench feature. There has been little disturbance to the area since the American Revolution. The early plans for the neighborhood of Wraggsborough show that this area of land was always planned out as a city park since the neighborhood's inception. This area stayed a city park till today, meaning there is a possibility that the third parallel would be located within the park underground.

⁹⁹ Blaskowitz, "A Plan of the Siege & Surrender of Charlestown..."

¹⁰⁰ Taylor, "Plan of Charlestown 1781 / Surveyed & Drawn by George Taylor."



Figure 36: Third parallel trench from the *Blaskowitz Map* overlaid on the modern landscape.



Figure 37: Overlay of the George Taylor Map 1781 with an aerial photograph of Wragg Mall.

In addition to using the georeferenced maps to locate the siege trenches and defense line, the historic maps also indicate changes to the landscape since the siege. The earliest maps, the Blaskowitz and Taylor maps, indicate the trench. The historic plats of the area, which include the Purcell plat created in 1801 to map out the streets in Wraggsborough (Figure 38), the Diamond plat created in 1807 by John Diamond (Figure 39), *The Bird's Eye View of Charleston* (Figure 40), an aerial photograph from 1957 (Figure 40) and the Sanborn Maps, all show no significant building campaigns in the survey area.¹⁰¹



Figure 38: Wragg Mall as seen on the 1801 *A Plan of Wraggsborough* by Joseph Purcell.

¹⁰¹ John Diamond, *The Plan of a Part of Charleston Neck*, 1807, Scale of two thousand feet 400 to an inch, 1807, South Carolina Historical Society, Joseph Purcell, *A Plan of Wraggsborough*, 1801, 1801, The Charleston County Register of Deeds, Drie, “Bird’s Eye View of the City of Charleston South Carolina 1872 / C. Drie, Lithographer.” “University of South Carolina: University Libraries: Aerial Photographs,” 1957, <https://delphi.tel.sc.edu/library/aerialphotos/>, *Sanborn Fire Insurance Maps* (Charleston, SC, 1888-1955), Plate 29, https://fims-historicalinfo-com.cpl.idm.oclc.org/FIMSSD.aspx?m=08124_1888.



Figure 39: *John Diamond Plat 1807* – Overlaid with a modern photo of Wragg Mall.



Figure 40: *Bird's Eye View of the City of Charleston, South Carolina 1872. Area showing Wragg Mall.*



Figure 41: Aerial Photograph of Wragg Mall in 1957 –
Courtesy University of South Carolina Libraries.

Wragg Mall LiDAR Results

LiDAR results from Wragg Mall provide more information on the landscape since the American Revolution. The British Army would have placed a siege trench on high ground to prevent the trench from filling up with water, unless that was their intention, as it was on the western portion of the peninsula on the second parallel.¹⁰² The LiDAR results revealed that Wragg Mall is still on relative high ground compared to the surrounding area (Figure 43). The georeferenced Blaskowitz and Taylor maps also show that the low areas, indicated by water drawn on the map, match up with the LiDAR indication of low areas of the peninsula, in blue (Figures 44 and 45). Blaskowitz and Taylor both placed the water lines in the correct low areas, and those low places have remained the same since the American Revolution with few changes to the topography. Today, from the vantage point of Wragg Mall, it is easy to see where the land to the south slopes downward, where the Americans dug a canal as an extra defensive measure. The LiDAR imagery of the area supports the placement of the canal to the south on both the Blaskowitz and Taylor maps, as signified by blue, a low area on the map.

¹⁰² Borick, *Gallant Defense*, 176.

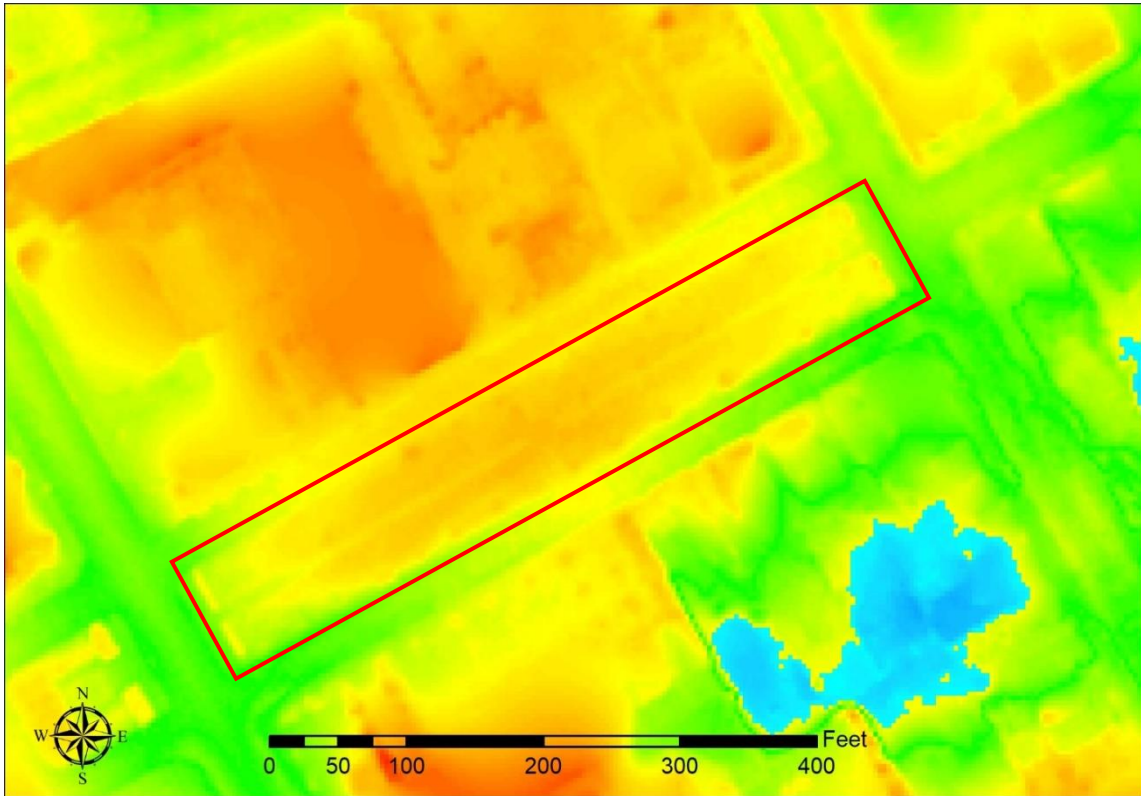


Figure 42: Wragg Mall- LiDAR showing the area of Wragg Mall on high ground, appearing in yellow.

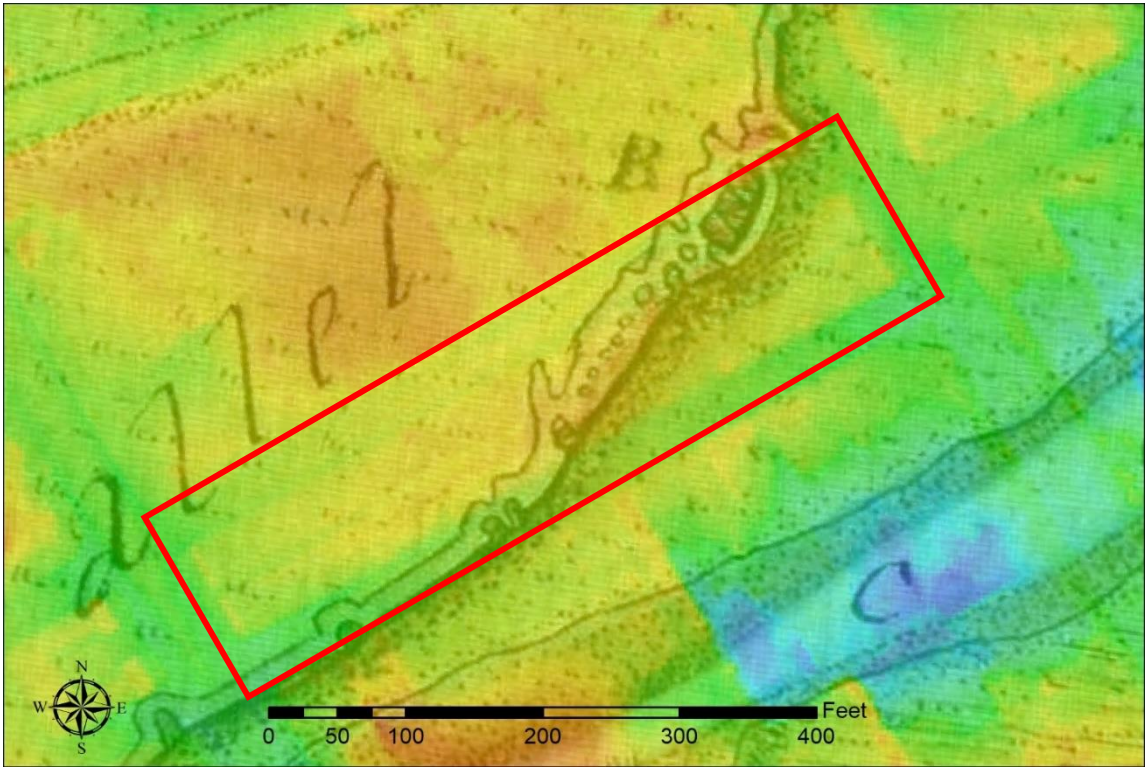


Figure 43: Wragg Mall LiDAR with Blaskowitz Map overlay.

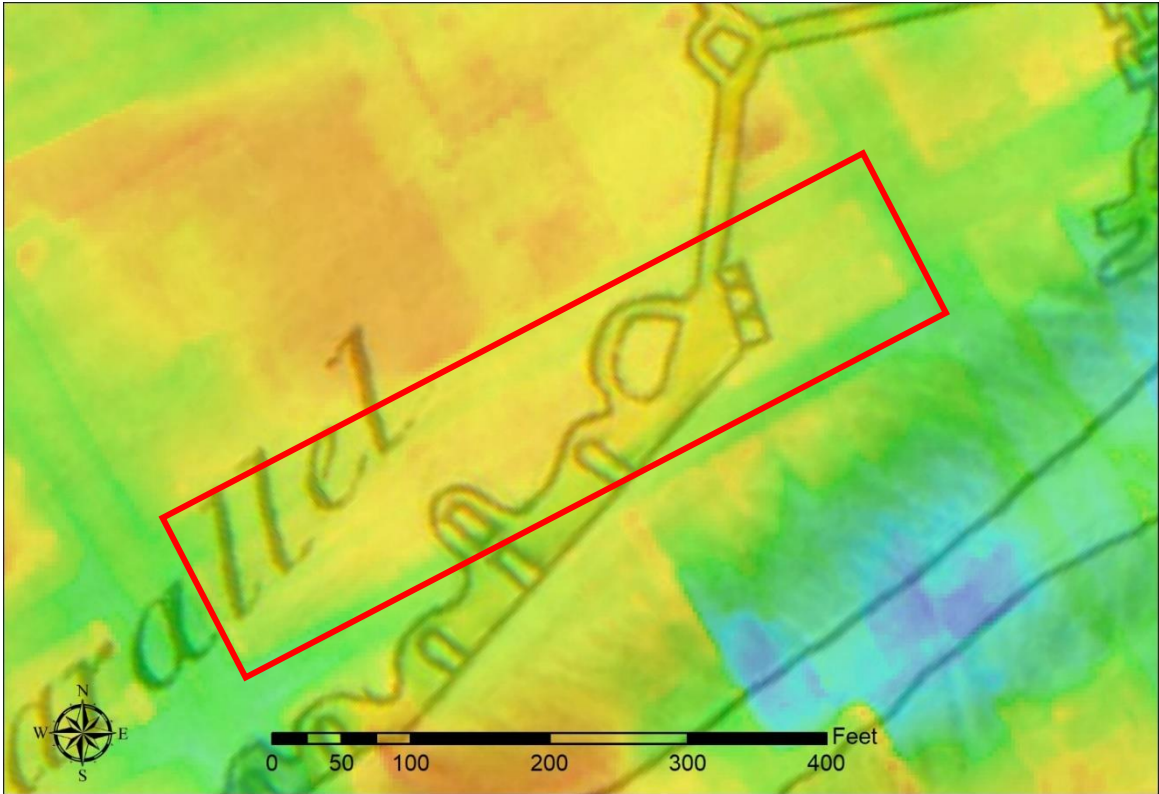


Figure 44: LiDAR of Wragg Mall Taylor Map.

Ground Penetrating Radar Results in Wragg Mall

In 2012, a GPR survey carried out by Jon Marcoux with the Charleston Museum in the nearby Aiken Rhett yard revealed possible trench features related to the Siege of Charleston in 1780.¹⁰³ The Blaskowitz map indicates that the trench ran diagonally and sloped through Wragg Mall with a gun battery in the middle of the trench in the north-east corner. Based on the georeferenced maps, the high ground in Wragg Mall as seen on LiDAR, and the previous GPR surveys done in the Aiken Rhett house backyard, the third parallel trench should be on the eastern side of Wragg Mall.

The present GPR survey for this thesis was carried out to the east of the central fountain in Wragg Mall and measured sixty feet north-south by one hundred twenty feet east-west. The transects avoided the trees in the mall and ran all the way through the central sidewalk. Along the way were streetlights which light the central sidewalk and a few benches. The GPR transects avoided these items. The transects were run north-south every two feet to provide for maximum coverage.

Since the Blaskowitz and Taylor maps both placed the trench in Wragg Mall, a GPR survey would provide further data to interpret the siege. In plan view, seen at 1.37 feet below the surface, there are three pipes that run east-west in the northern portion of the mall (Figure 45, Feature 1). This indicates that there have been some sort of ground moving activities in Wragg Mall through the years to place utility lines. Feature three is a

¹⁰³ Borick et al., *Searching for the 1780 Siege of Charleston: History, Archaeology and Remote Sensing*, 20.

brick lined path in the middle of the park (Figure 45, Feature 2). There is also one final feature located in the southern portion of the survey area (Feature 3). It is a linear feature running approximately one hundred feet east-west by twenty-five feet north-south. In profile, the areas with multiple high amplitude point-source hyperbolas are in the southern portion of the survey area; these areas indicate fill episodes. These areas are one to two feet below the surface of the ground and almost six feet below the surface in a couple of areas. Several transects have the same high amplitude point-source reflections spanning one hundred feet in the middle of the survey area. These multiple fill episodes mean that the trench was filled in over periods of time, maybe years.

The trenches related to the 1780 siege were eventually filled in. Both the Blaskowitz and Taylor maps place a somewhat amorphous portion of the trench in the park. This amorphous shape probably explains the ill-defined feature found in this GPR survey in the southern portion of Wragg Mall. Since this feature is not well-defined and does not include well defined trench features, the findings in Wragg Mall cannot be fully correlated to the Siege of 1780.

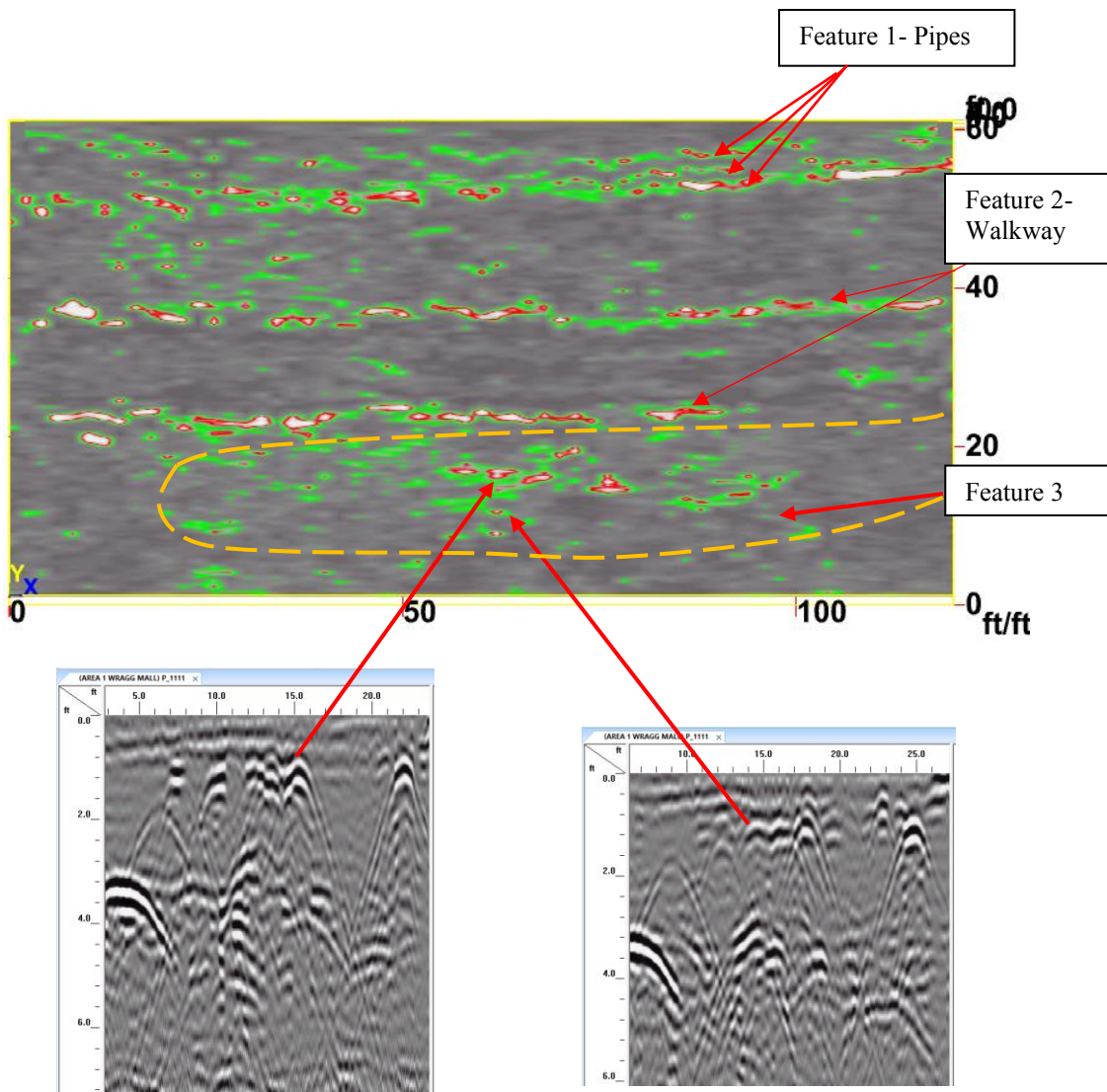


Figure 45: Plan view of Wragg Mall at 1.37 feet, with profile views showing what is beneath the ground.

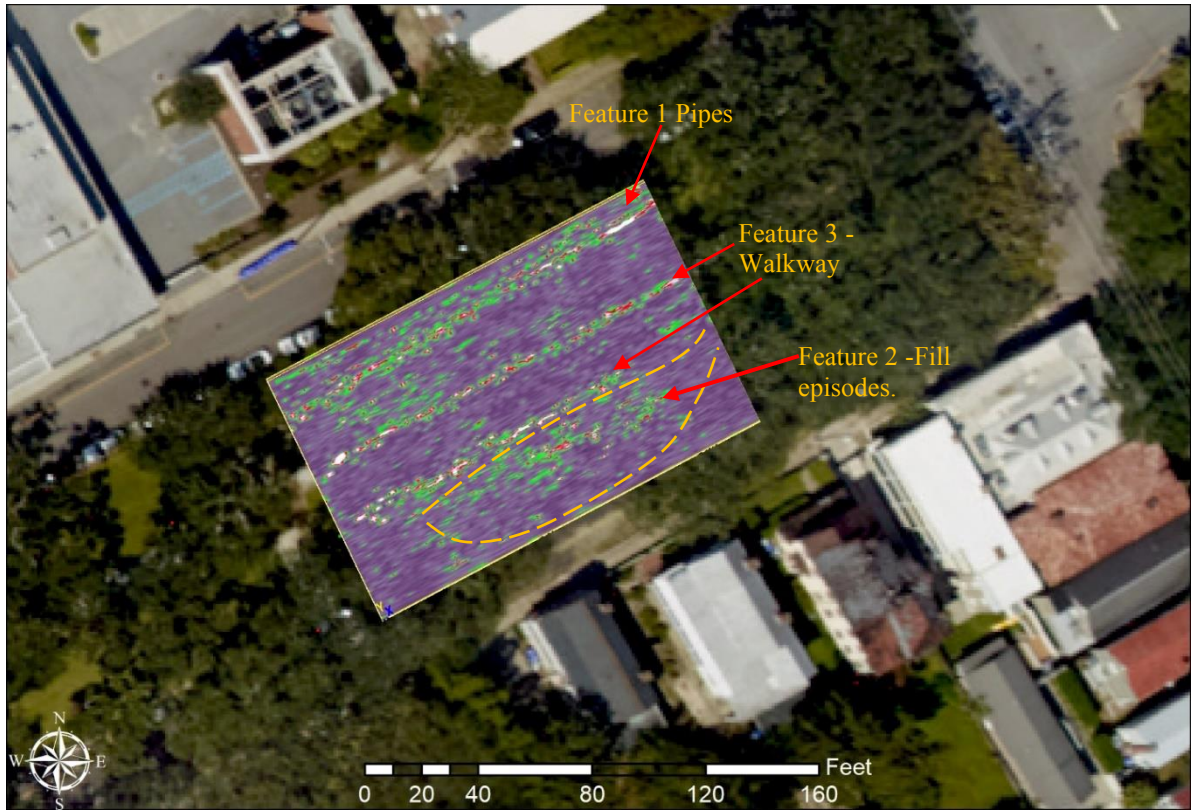


Figure 46: GPR survey of Wragg Mall at 1.37 feet overlaid with an aerial photo.

Wragg Square Historic Accounts

Wragg Square is located on the eastern central portion of the peninsula. It is currently a greenspace that has been a part of the Second Presbyterian Church for over two centuries. The extant historic accounts of the Siege of Charleston do not specifically refer to this area as the place where the American Army placed a portion of the defense wall. The only mention of the general area refers to the works stretching across the Charleston neck in this area toward the Cooper River. The reference comes in a letter written from Chevalier de Laumoy to Benjamin Lincoln, who commissioned him and a few others to strengthen the defense line. He said, “Since we don’t know wich side of the Town is most in danger, wich the enemy mean to attack, we must extend our cares to all sides as much as possible, to be very equally strong everywhere at the same time.”¹⁰⁴ This small reference to extending the defense work across the neck of the peninsula is the only remote reference insinuating that the defense line may have crossed Wragg Square.

Wragg Square Historic Maps and GIS

The entirety of the Blaskowitz and Taylor maps were georeferenced onto the modern landscape, which provided the study areas. On both the georeferenced Taylor and Blaskowitz maps, a portion of the east side of the American defense appears to be located in Wragg Square (Figures 48, and 49). The Blaskowitz and Taylor maps show slight differences in their placement of the defense works when georeferenced with the modern landscape. The Blaskowitz map places a redan almost entirely within the western portion

¹⁰⁴ Carl P. Borick, *A Gallant Defense* (University of South Carolina Press, 2003). p. 42.

of the square. While the Taylor map places the redan straddling the western edge of the park and Meeting Street. On the Taylor map (Figure 47), starting on the west side of Wragg Square straddling Meeting Street is a triangle shaped redoubt. The line then continues from the southwest corner of Wragg Square, by the current-day garden in the southern portion of the square, running northeast one hundred feet to the cast iron fence on the northern boundary of Wragg Square. The rest of the defense line then bends slightly southeast before angling northeast again before exiting the square. In the southern portion of the square is another defense line, which is not connected to the main defense line. On the Blaskowitz map (Figure 48), the triangle redoubt on the eastern portion of Wragg Square is located within the square with the western edge of it on Meeting Street. The eastern portion of the redoubt angles southeast before angling northeast, around one hundred feet, till it bisects the wrought iron fence on Wragg Square's northern boundary. There is a gun battery that bisects the wrought iron fence, before the defense exits the square on the north, angling in a sharp turn northeast outside of the square.



Figure 47: *George Taylor Map 1781*: Overlaid on a modern aerial photo of Wragg Square.



Figure 48: *Charles Blaskowitz Map 1780*: georeferenced on a modern aerial photograph of Wragg Square.

In addition to the georeferenced Taylor and Blaskowitz maps, research into other period maps show that there have not been any major building campaigns in the survey area since the American Revolution.¹⁰⁵ This area was made into a park shortly after the American Revolution, as shown on a Purcell map from 1801 (Figure 49).¹⁰⁶ The grading for the park and the addition of the sidewalks around the perimeter of Wragg Square mean that some ground-altering activities have happened in the area. Other maps such as

¹⁰⁵ Carl P. Borick, “The SAA Archaeological Record May 2020 - Volume 20 Number 3 Cover 2,” accessed March 15, 2021, <http://onlinedigeditions.com/publication/?i=660136&p=2&pp=1&view=issueViewer>, 9.

¹⁰⁶ Purcell, Joseph. “A Plan of Wraggsborough.” 1801. The Charleston County Register of Deeds.

the John Diamond plat from 1807 (Figure 50), the 1872 *Bird's Eye View of Charleston* (Figure 51), the 1957 aerial photograph, and all the Sanborn Maps through the available years indicate no major building campaigns.¹⁰⁷ The lack of evidence of major building campaigns to the survey area from the time of the Siege until the present provides a high likelihood that the filled-in earthwork defense trench is in a portion of Wragg Square. The area likely to yield the best results is the northern portion of Wragg Square, where Blaskowitz and Taylor's georeferenced maps place the defense line.

¹⁰⁷ Purcell, "A Plan of Wraggsborough", Diamond, "The Plan of a Part of Charleston Neck", Drie, "Bird's Eye View of the City of Charleston South Carolina 1872 / C. Drie, Lithographer", "University of South Carolina: University Libraries: Aerial Photographs", *Sanborn Fire Insurance Maps* (Charleston, SC, 1888-1955), Plate 32, https://fims-historicalinfo-com.cepl.idm.oclc.org/FIMSSD.aspx?m=08124_1888.



Figure 49: Wraggs Square – *A Plan of Wraggsborough 1801* by Joseph Purcell overlaid with the modern landscape.



Figure 50: Wragg Square *John Diamond Map 1870* overlaid on a modern aerial photo.

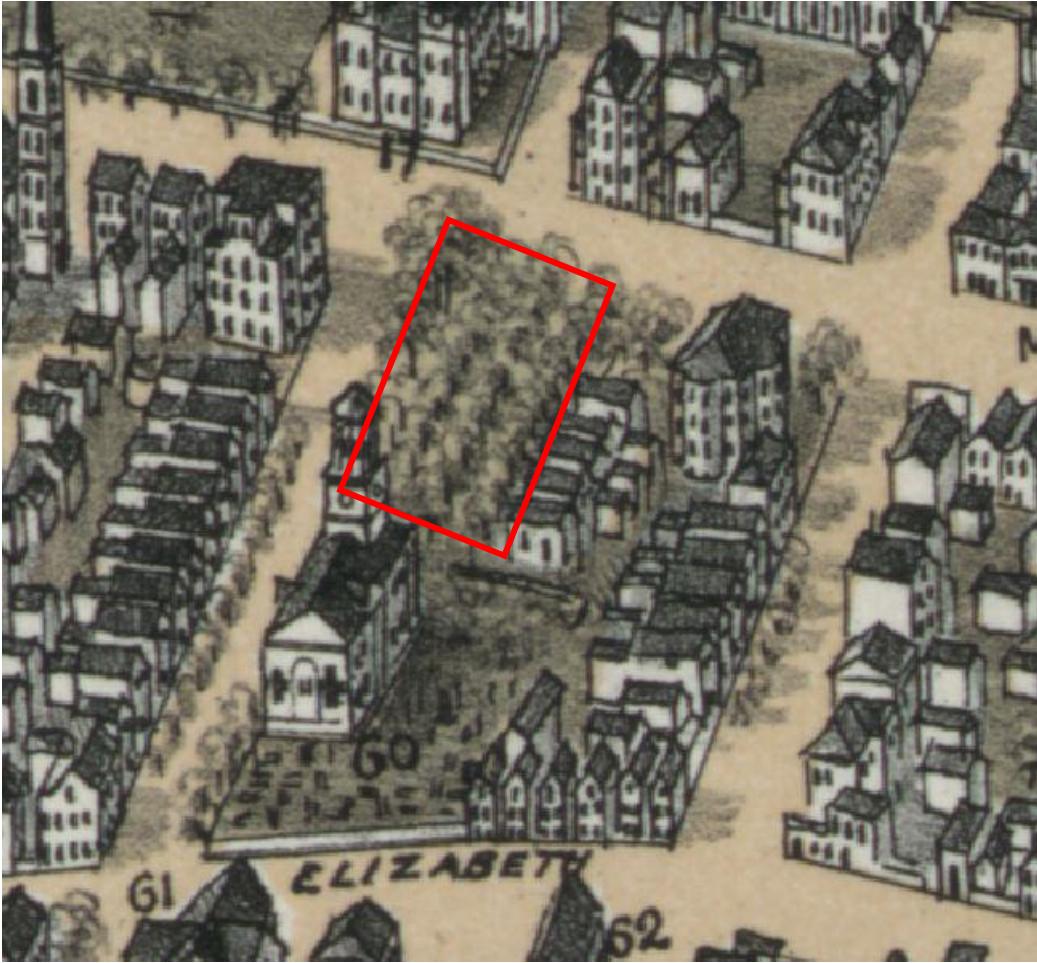


Figure 51: *Bird's Eye View of the City of Charleston 1872* showing Wragg Square.



Figure 51: Aerial Photograph of Wragg Square in 1957 – Courtesy University of South Carolina Libraries.

Wragg Square LiDAR Results

The LiDAR imagery indicates that the high and low areas on the Blaskowitz and Taylor maps remain the same on the modern landscape today (Figures 54 and 55).

Wragg Square is indicated as an elevated red area signifying high ground on LiDAR.

Since most military features were placed on high ground, and the area in Wragg Square is natural high ground, there is a higher likelihood that a portion of the defense wall is still in Wragg Square below ground.

LiDAR imagery from the area supports several additional observations from the Blaskowitz, Taylor, Purcell, Sanborn and Diamond maps. The area of Wragg Square has not undergone major earth moving activities since the American Revolution. In figures 54 and 55, both the Blaskowitz and Taylor maps match up with the tidal creeks drawn on the map and low areas shown on the LiDAR map, reflected in blue. The LiDAR study done on these important areas prove that the correspondence between the low areas as drawn on the Blaskowitz and Taylor maps and the low areas on LiDAR show that the georeferencing analysis is relatively accurate. This area was chosen for the survey, because these areas were consistent through all maps, including the LiDAR showing the topography of the land at Wragg Square.

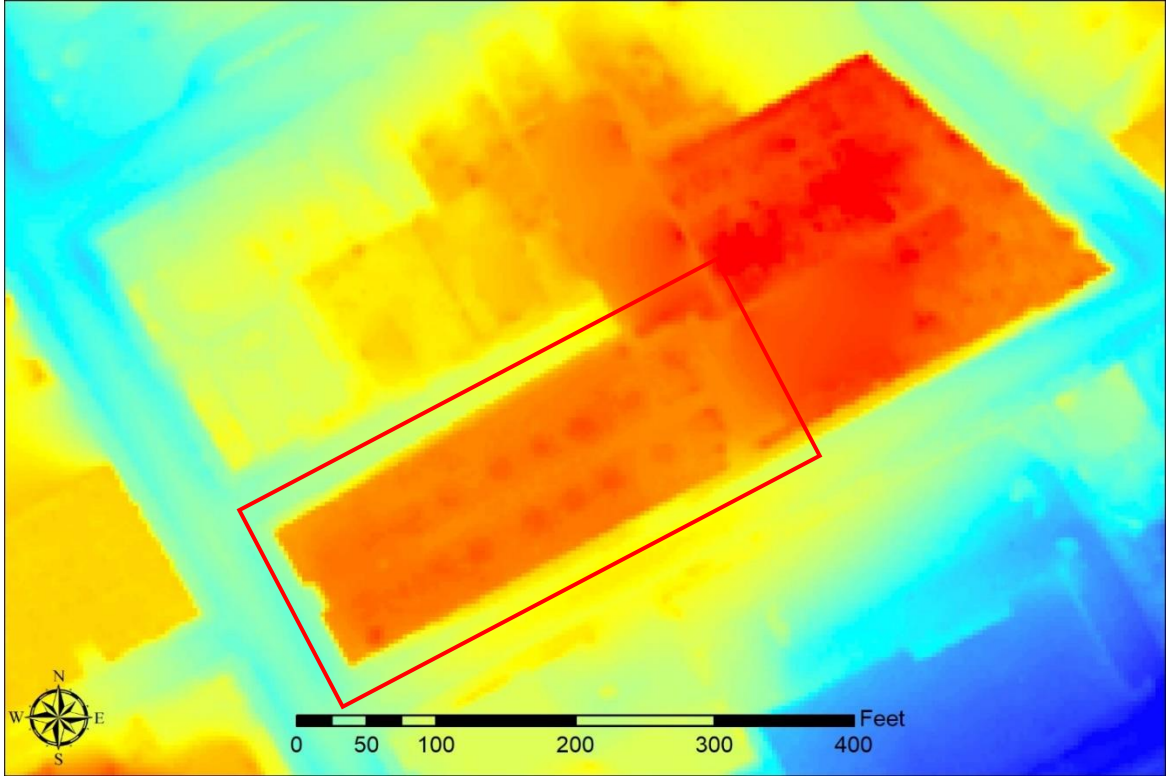


Figure 53: Wragg Square LiDAR scan.

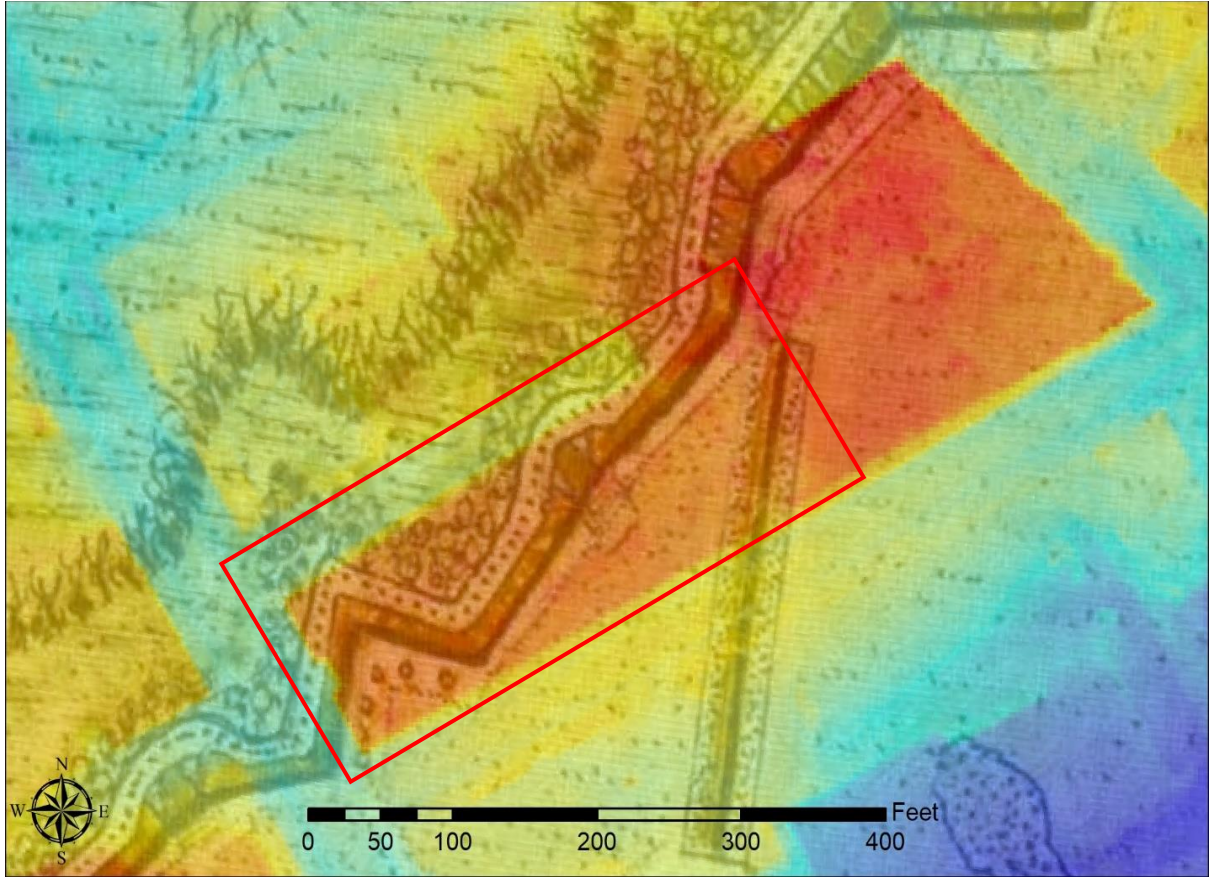


Figure 54: Wragg Square LiDAR with the *Charles Blaskowitz Map 1780*.

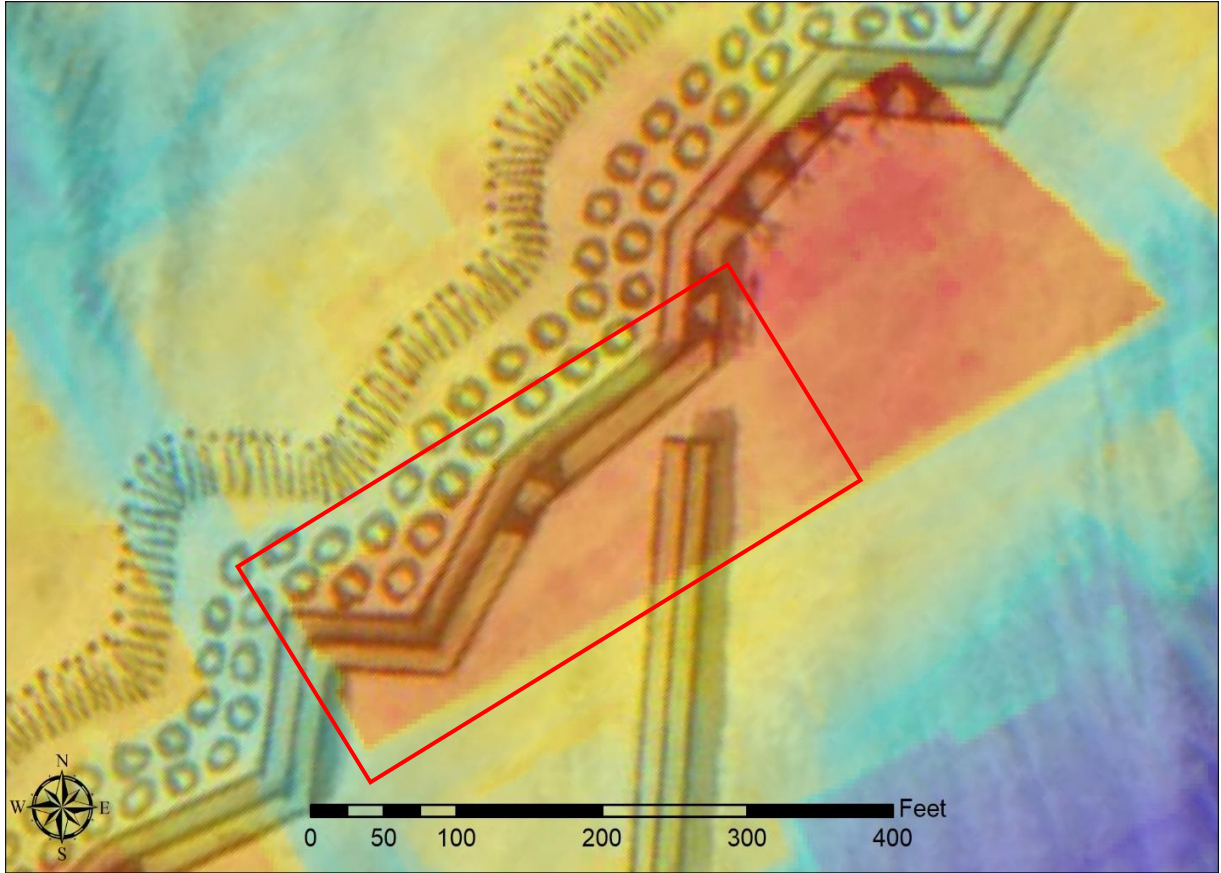


Figure 55: George Taylor *A Plan of Charles Town 1781* overlaid with LiDAR data.

Ground Penetrating Radar Results in Wragg Square

Based on the historic accounts, georeferenced historic maps, and LiDAR data, Wragg Square is a prime candidate to have historic features below the ground surface. The northern portion of Wragg Square was selected for the GPR survey grid based on the placement of the defense work on the Taylor and Blaskowitz maps (Figures 48 and 49).¹⁰⁸ The survey area also showed no major building campaigns which would have destroyed remaining features related to the siege. The survey was conducted to the east of the garden in the western portion of the square. After survey area one was complete and features were located, the decision was made to conduct two more surveys, one to the east of survey area one and a survey area to the south of area one.

Since the GPR survey of Wragg Square was done in three areas, and the features discovered are connected, the GPR survey is discussed below as one area. The plan view of the GPR survey indicates that four linear features were present at three feet below the surface and are well-defined features (Figures 59). These are indicated by areas of red, green, and white which indicate features with high reflectivity. The plan view of the survey area indicates that feature one is oriented diagonally, running one hundred feet southwest to northeast and ending at the perimeter of the survey area in the northern portion of Wragg Square. Feature two is approximately sixty feet long and located in the northeastern corner of the survey area, oriented northwest to south east in a diagonal. Feature three is approximately seventy feet long and approximately thirty feet wide; it is

¹⁰⁸Blaskowitz, "A Plan of the Siege & Surrender of Charlestown..."; Taylor, "Plan of Charlestown 1781 / Surveyed & Drawn by George Taylor."

oriented northeast to southwest in the south eastern-most portion of the survey area.

Feature four is twenty feet wide in plan view and oriented in the southeast portion of the entire survey area. A portion of it appears to be cut off at the survey boundaries. All four features are linear, highly reflective, and distinct from the surrounding area.

The profile of feature one is in a “V” shape with multiple high-amplitude point-source reflection hyperbolas, which indicate fill episodes (Figure 57). The “V” shape indicates a “defensive” type of trench, dug in front of an earthen fortification. The bottom of the “V” shaped trench has a high amplitude reflector, which contrasts with the lower amplitude reflector above it. This indicates that the bottom of the ditch is filled with an organic rich material holding water at the bottom of the ditch. Feature one is approximately three to four feet deep and approximately thirty feet wide. The profile of feature two is in a “U” shape with multiple high amplitude point-source reflection hyperbolas, indicating fill episodes (Figure 56). The “U” shape indicates a filled in trench. There are multiple fill episodes on this profile, each with a different dielectric, indicating different soil types. This feature is in a “U” shape and around thirty feet wide in plan, most likely larger, since a portion of the trench is outside of the survey area to the north. Feature three is a “U shaped” profile indicating multiple high-amplitude point-source reflection hyperbolas, indicating fill episodes (Figure 56). This “U” shaped feature is approximately twenty feet wide and seventy feet long, running into the southern portion of the survey area. The area near the surface indicates multiple hyperbolas, probably indicating roots that have grown over the trench area. Feature four (Figure 59) is a wide “U” shaped trench in the southeastern portion of the square approximately thirty

wide and four to six feet deep, indicated by multiple high-amplitude point-source reflection hyperbolas, indicating fill episodes. A portion of the feature was cut off by the survey area.

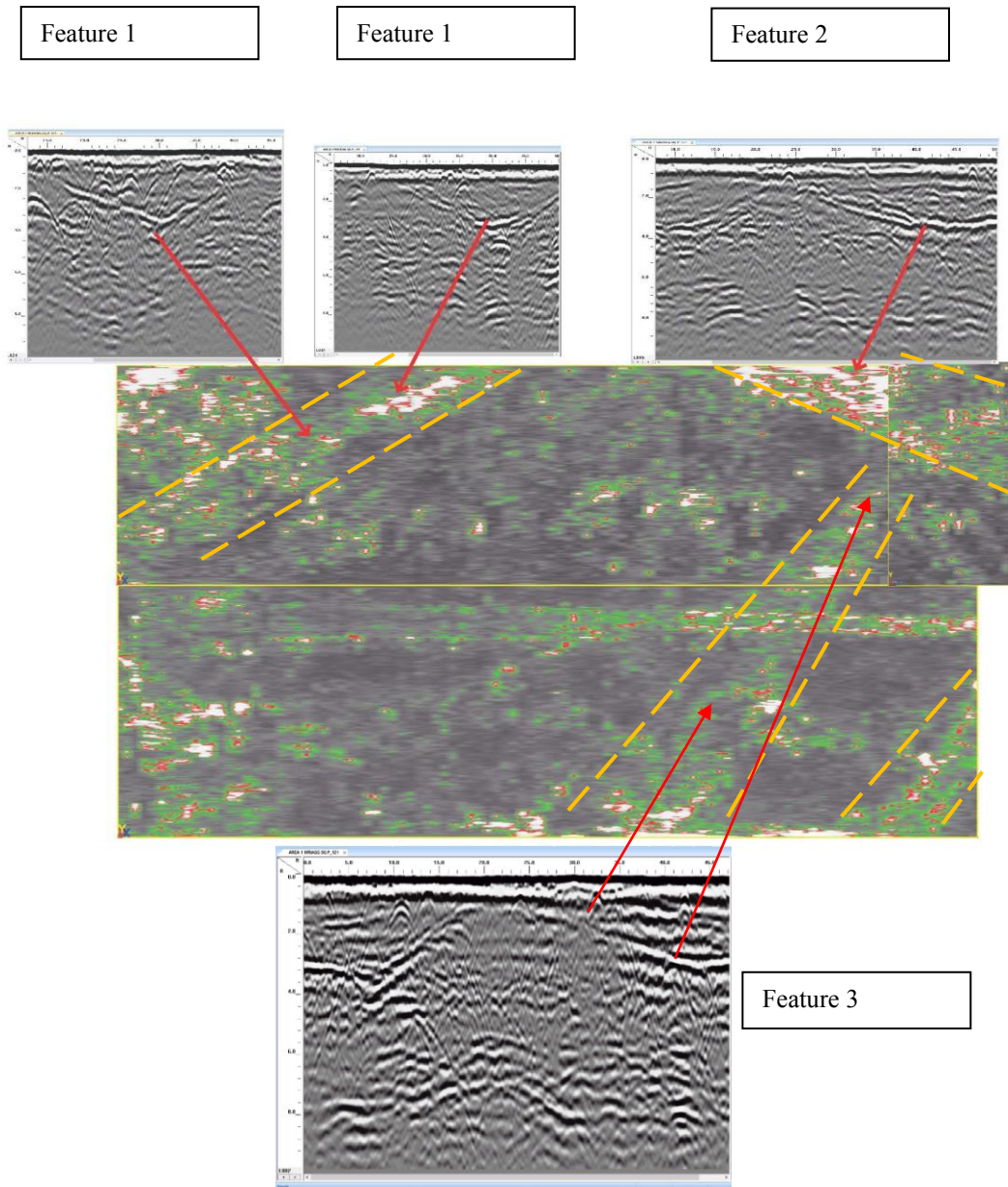


Figure 56: Wragg Square showing features 1-3 at three feet in plan.

Feature 2

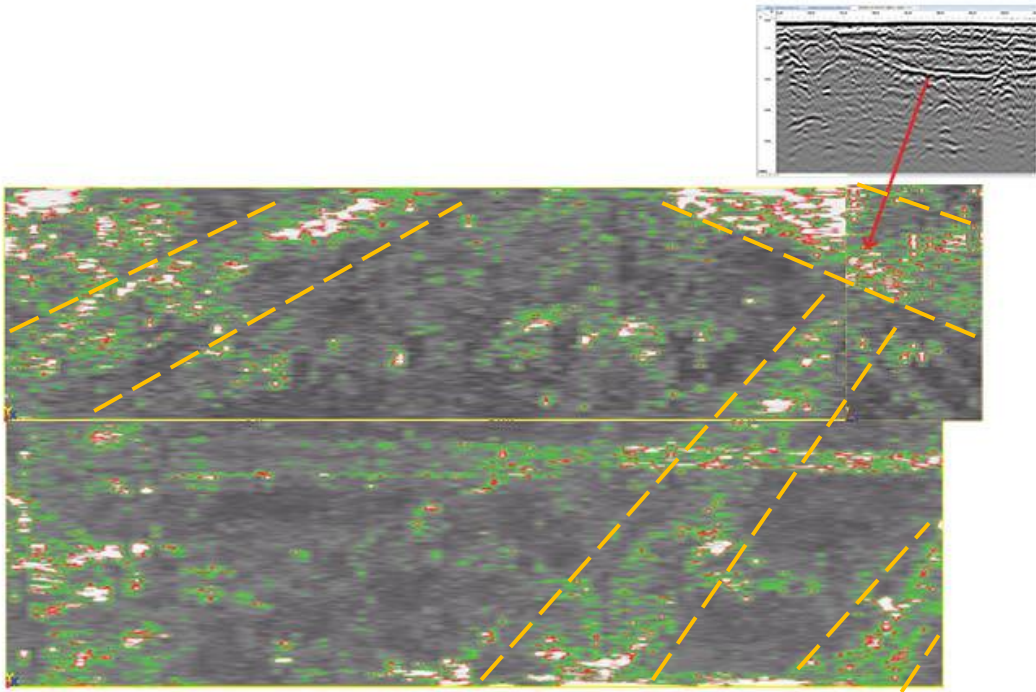


Figure 57: Wragg Square Showing feature two on the right.

Feature 4

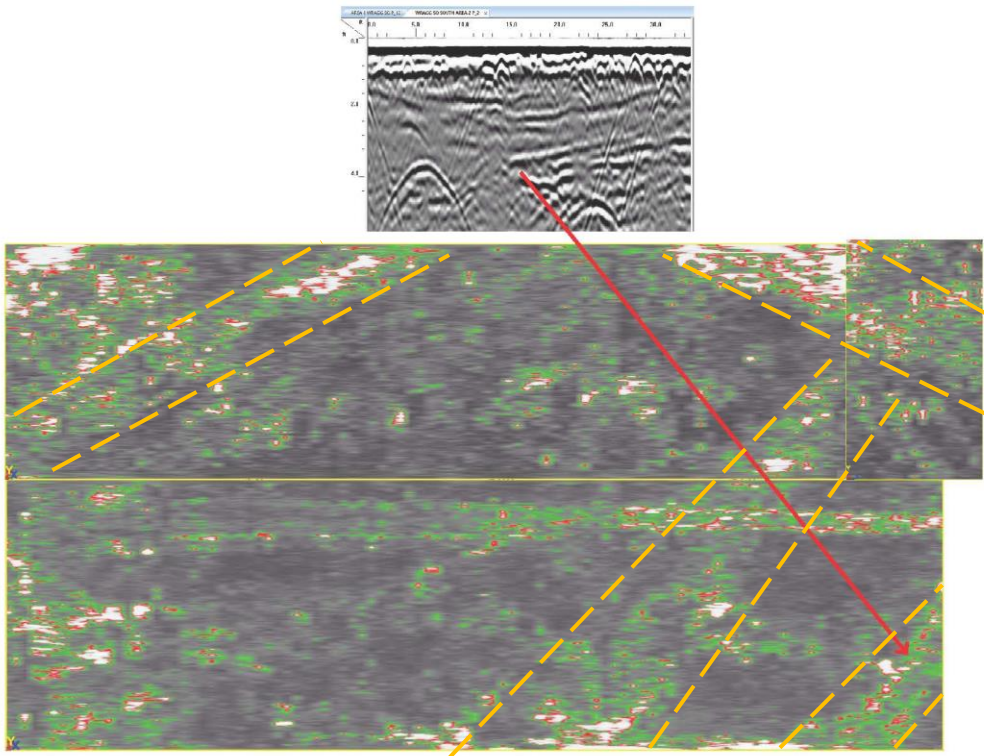


Figure 58: Wragg Square showing feature 4 in bottom right.

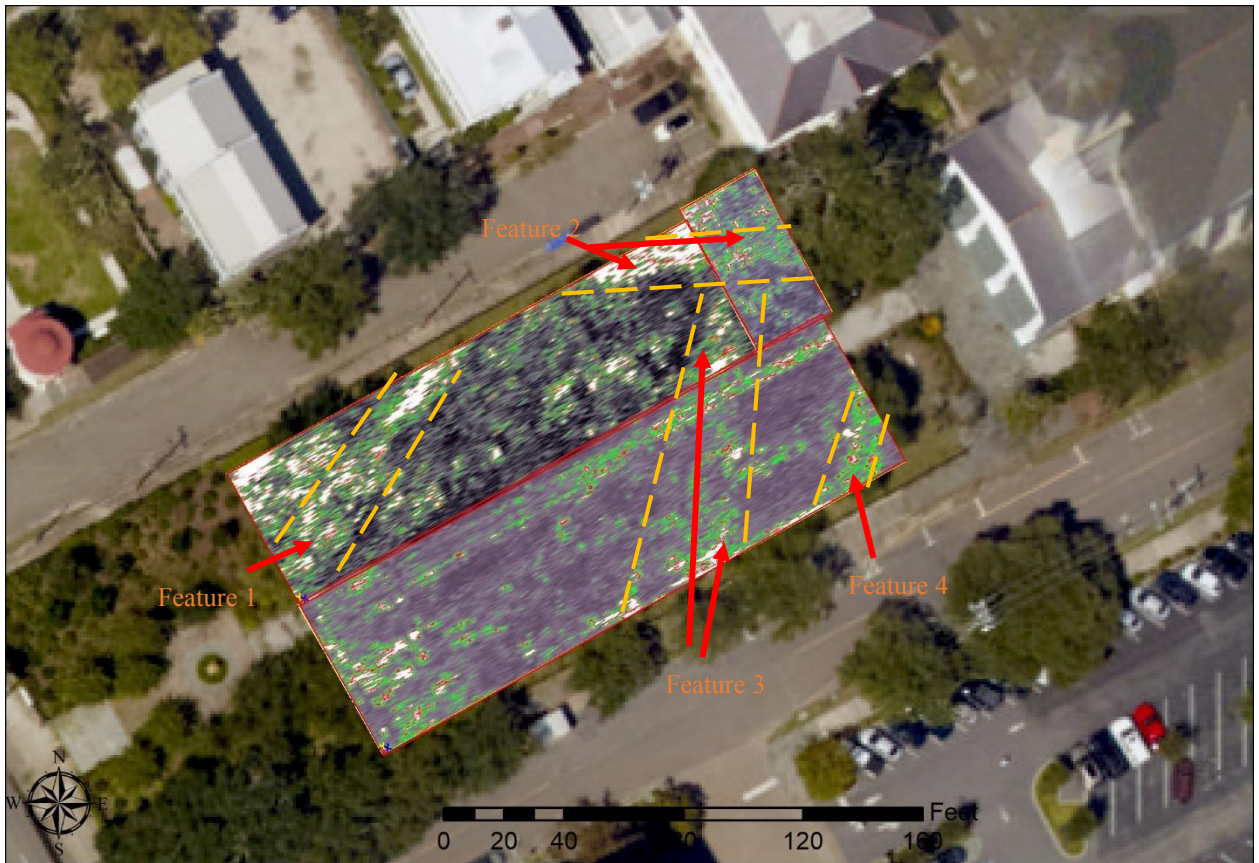


Figure 59: Plan view at 3 feet below the surface, Wragg Square.

Archaeological Excavations in Wragg Square

In January of 2016, the City of Charleston decided to place a new staircase entering Wragg Square. This provided the opportunity for the Charleston Museum archaeologist Martha Zierden to explore a possible trench feature in the area. Once the excavating began for the new staircase, Zierden and her team identified a trench feature as seen in the soil stratigraphy after the excavator cleared a way for the stairs (Figure 60 and 61).

The dip in the soil and the large dark band indicated a trench was located in this area and filled in with sand as evidenced by the sand above the black band of sand. The present study matches up the size and orientation with the anomalies seen in the GPR scan of the north portion of the square. The black band of soil matched up with the Blaskowitz and Taylor map overlays of the square. This combined with the GPR scan provides further evidence that the siege line has finally been identified in Wragg Square.

During Zierden's investigations, she did not identify any items in the trench feature that relate to the siege. However, the sharp angle of the profile suggested that it was a parapet, or a portion of the defense wall, from the Siege of Charleston in 1780 (Figure 60).¹⁰⁹ The evidence of how the dark band of soil matched the profile of a typical trench and its orientation to the GPR scan are the final proof that the anomaly in Wragg Square is the defense line from the Siege of Charleston from 1780.

¹⁰⁹ Borick et al., *Searching for the 1780 Siege of Charleston: History, Archaeology and Remote Sensing*, 104.



Figure 60: North profile of trench feature in Wragg Square from 2016 excavation. Dark band signifying fill. Images are courtesy of *The Charleston Museum*.



Figure 61: Red box showing where the 2016 excavations took place.

Marion Square Historic Accounts

Marion Square is a public park in the center of the peninsula in downtown Charleston. Before the American Revolution the area was north of the city and considered “the county” to Charlestonians. The area was occupied by forest and was owned to the east by the Manigault family and to the west by the Wragg family.¹¹⁰ These two families eventually sold portions of their land to the city to build a fortification to defend the northern approach to the city, known as the hornwork.¹¹¹ A hornwork consists of two bastions connected by a curtain wall; the two bastions resemble the horns of a bull.

The decision to fortify the northern approach to the town came in the mid-eighteenth century when the British colonies were threatened with invasion by French and Spanish forces.¹¹² In order to fortify the town, the British government in late 1757 hired Lieutenant Emanuel Hess to design a fortification that protected the northern approach to the city straddling the Broad Path, today known as King Street.¹¹³ The principal material that made up the northern curtain wall was tabby, a type of concrete made of lime, oyster shells, sand, and water. Lieutenant Hess began construction of the fortification in 1758 and covered ten acres of land that encompassed half of modern-day Marion Square stretching to the west of the Broad Path.¹¹⁴ The project continued for two

¹¹⁰ Nic Butler, “A Brief History of Marion Square, Part 1,” *A Brief History of Marion Square, Part I, Charleston County Public Library* (blog), September 1, 2017, <https://www.ccpl.org/charleston-time-machine/brief-history-marion-square-part-1>.

¹¹¹ Butler, “A Brief History of Marion Square, Part 2 | Charleston County Public Library.”

¹¹² Butler, “A Brief History of Marion Square, Part 2 | Charleston County Public Library.”

¹¹³ Butler, “A Brief History of Marion Square, Part 2 | Charleston County Public Library.”

¹¹⁴ Butler, “A Brief History of Marion Square, Part 2 | Charleston County Public Library.”

years and was considered a massive construction project.¹¹⁵ However, as threats from the Spanish and French waned, the construction project on the tabby fortification stopped. Efforts were then focused on protecting and fortifying the town from the harbor side. Several years passed before the American Revolution brought new threats to the town.¹¹⁶ By the time British forces threatened the peninsula in the early part of 1780, the American Military had completed the back side of the horn work with an earthen wall.¹¹⁷ Historic accounts from Banastrea Tarleton and William Moultrie describe the fortress as a Citadel.¹¹⁸ In front of the hornwork was another defensive line that stretched from the Cooper River to the Ashley River.

Marion Square Historic Maps and GIS

The georeferenced Blaskowitz and Taylor maps both placed a portion of the hornwork in Marion Square. The Blaskowitz map placed the eastern side of the fortification just over the middle of Marion Square (Figure 62). To the north, the eastern horn of the fortification bisects Tobacco Street before curving south toward the tabby remains of the hornwork still visible in the park today. The georeferenced Taylor map follows a similar path in its placement of the hornwork, although different in some ways (Figure 63). The Taylor map placed the eastern side of the fortification just west of the center of Marion Square, as signified by the cross sidewalks, which meet in the center.

¹¹⁵ Butler, “A Brief History of Marion Square, Part 2 | Charleston County Public Library.”

¹¹⁶ Butler, “A Brief History of Marion Square, Part 2 | Charleston County Public Library.”

¹¹⁷ Butler, “A Brief History of Marion Square, Part 2 | Charleston County Public Library.”

¹¹⁸ Butler, “A Brief History of Marion Square, Part 2 | Charleston County Public Library”, Banastrea Tarleton, *A History of the Campaigns of 1780 and 1791 in the Southern Provinces of North America*. (London: Printed for T. Cadell, in the Strand, 1967), 12.

The eastern horn bisects Tobacco Street before curving south toward the tabby remains of the hornwork. The georeferenced maps along with the Natalie Adams study provide significant evidence that the hornwork is preserved below the ground.¹¹⁹

North of Tobacco Street, the tobacco inspection building stood in the late eighteenth century to the early nineteenth century. During this time there was a road that bisected the city-owned green area called Lowndes Street, which may have caused ground-altering changes to the area, seen on a Purcell plat from 1798 (Figure 64).¹²⁰ Both the Purcell maps from 1798 and 1801 (Figure 66) and the Diamond plat from 1807 (Figure 67) also indicate no significant building campaigns on the site.¹²¹ *The Bird's Eye of Charleston* from 1872 shows the area with cannons belonging to the Citadel (Figure 67).¹²² Also, a 1954 aerial photograph and Sanborn Maps of available years indicate no major buildings campaigns (Figure 68).¹²³ However, the maps do not show the placement of utility lines, which may have destroyed evidence of the siege.

During the nineteenth century, the area became a large parade ground for the Citadel cadets.¹²⁴ By the early twentieth century, the Citadel had moved from its area to the north of Marion Square and to the banks of the Ashley River. At this point, the square was still used as parade grounds for paramilitary until the state limited the number of

¹¹⁹ Natalie Adams, “Now a Few Words about the Works... Called the Old Royal Work’ Phase I Archaeological Investigations at Marion Square, Charleston, South Carolina.”, June 26, 1998.

¹²⁰ Joseph Purcell, *Lands Belonging to the Estate of John Wragg*, 1798.

¹²¹ Diamond, “The Plan of a Part of Charleston Neck.”, Purcell, “A Plan of Wraggsborough.”

¹²² Drie, “Bird’s Eye View of the City of Charleston South Carolina 1872 / C. Drie, Lithographer.”

¹²³ “University of South Carolina: University Libraries: Aerial Photographs”, *Sanborn Fire Insurance Maps* (Charleston, SC, 1888-1955), Plate 3 and 31, https://fims-historicalinfo-com.cepl.idm.oclc.org/FIMSSD.aspx?m=08124_1888.

¹²⁴ Drie, “Bird’s Eye View of the City of Charleston South Carolina 1872 / C. Drie, Lithographer.”

paramilitaries.¹²⁵ Therefore, this piece of land was no longer used as a parade ground. At this point, in time the Rotary Club of Charleston began a beautification project of the park. Eventually, in the early twentieth century, Marion Square became a public park.¹²⁶

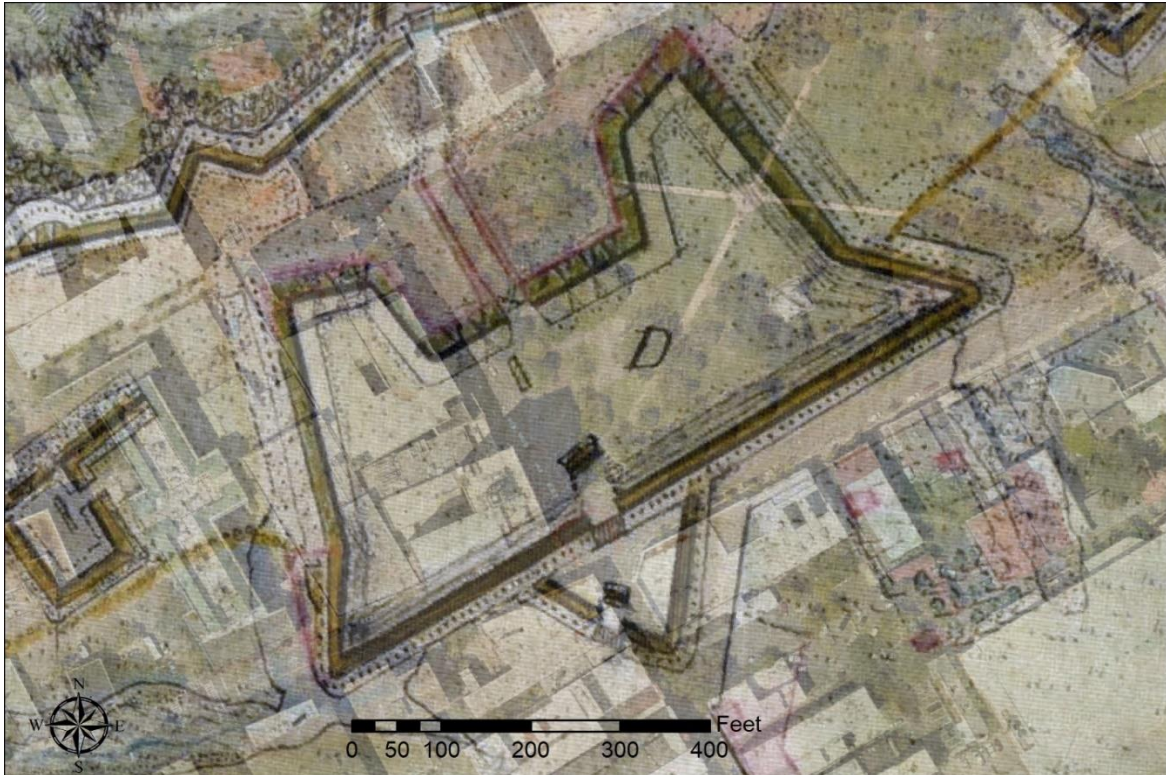


Figure 62: *Charles Blaskowitz Map 1780* showing the hornwork georeferenced with an aerial photograph.

¹²⁵ Butler, “A Brief History of Marion Square, Part 1.”

¹²⁶ Butler, “A Brief History of Marion Square, Part 2.”

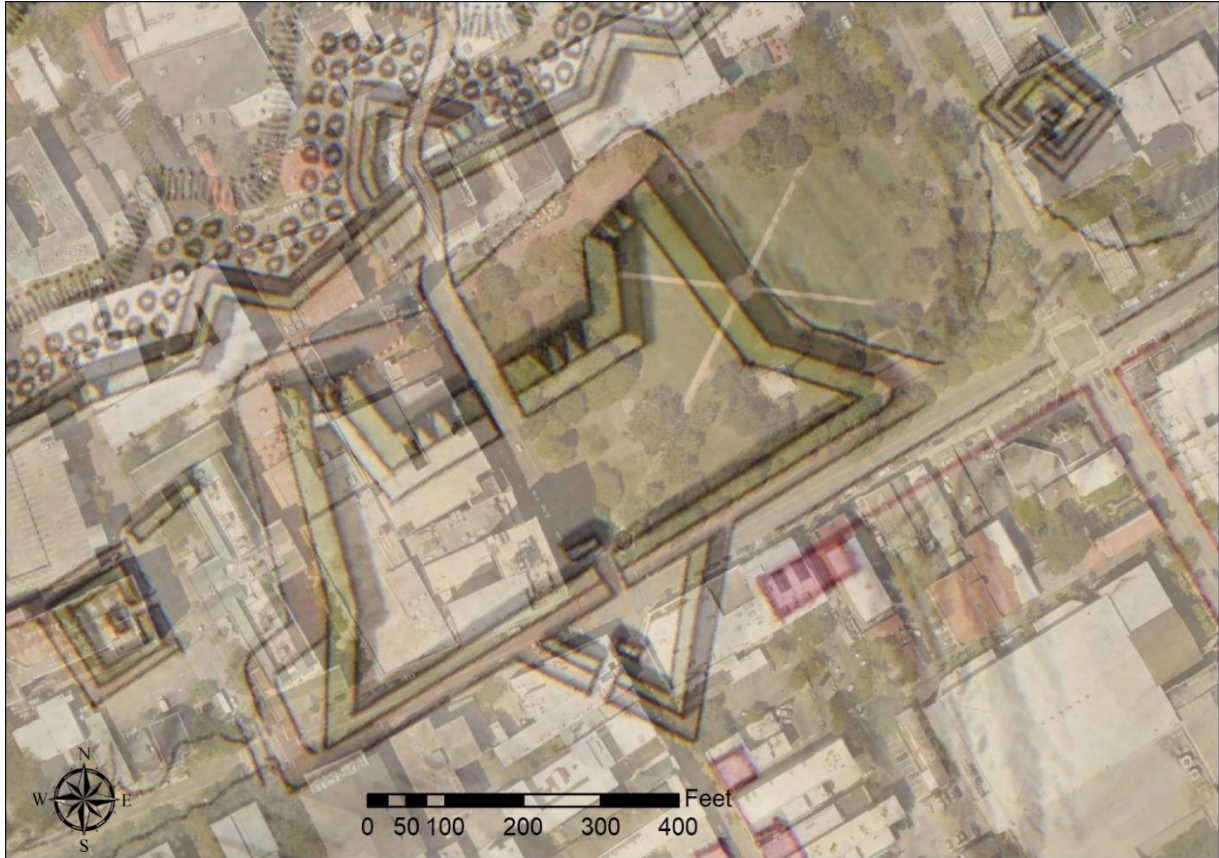


Figure 63: *George Taylor Map Plan of Charles Town 1781.*
Georeferenced to an aerial photograph.

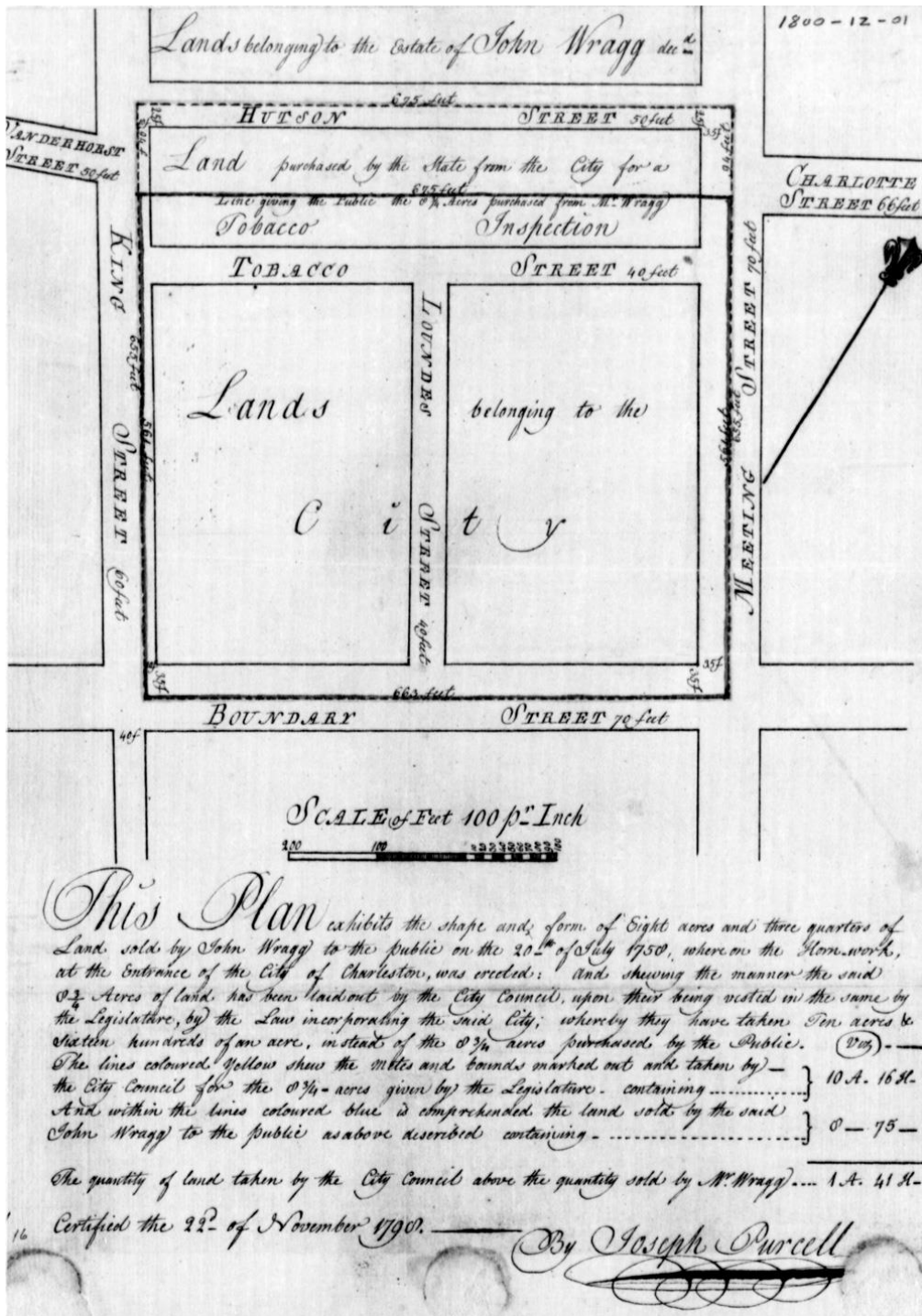


Figure 64: Joseph Purcell 1798 plat of public lands in what would eventually become Marion Square. From the Collections of the South Carolina Department of Archives and History. Credit to Nic Butler.

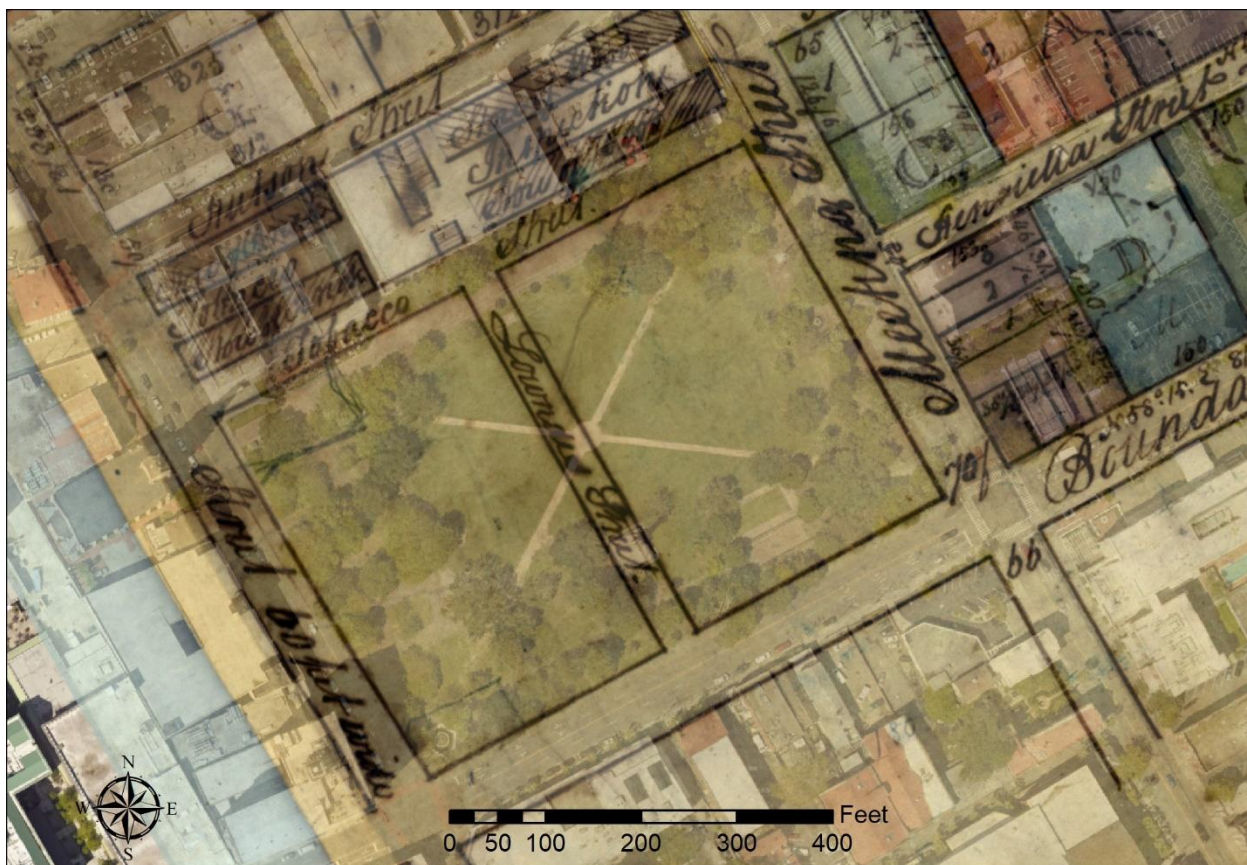


Figure 65: *A Plan of Wraggsborough 1801* by Joseph Purcell overlaid on a modern aerial photograph.

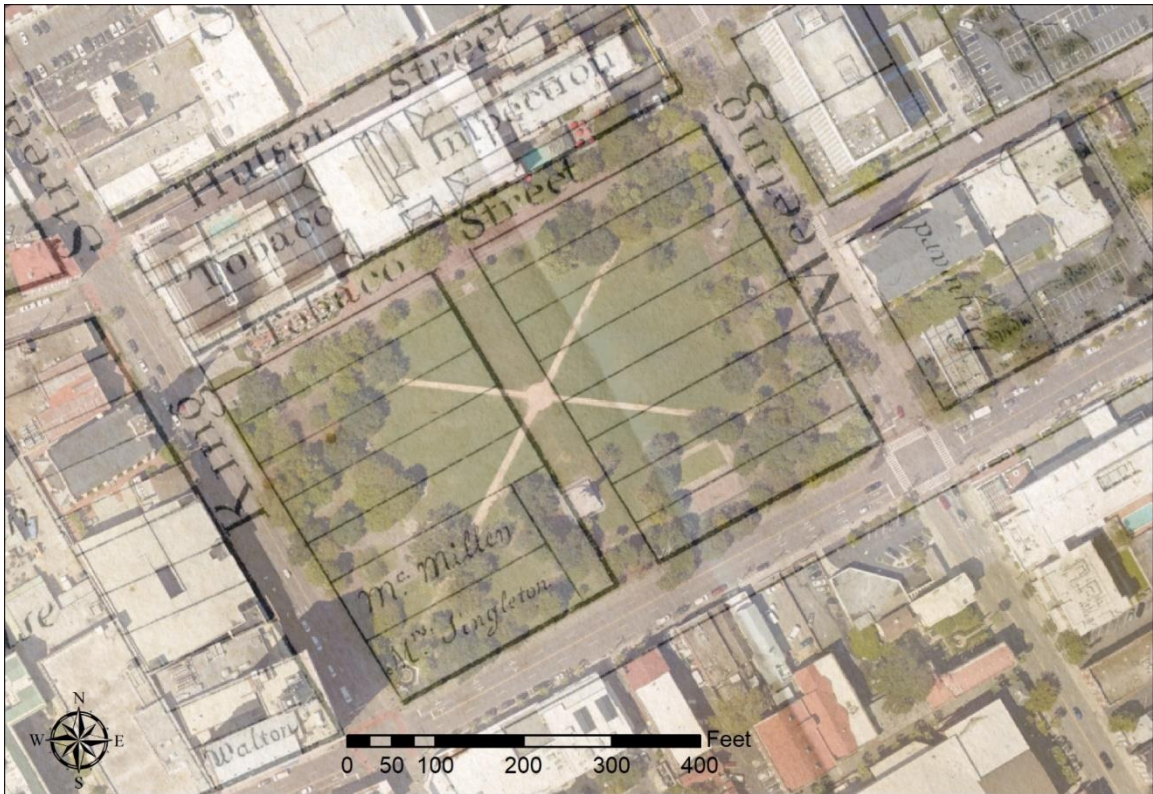


Figure 66: *The Plan of a Part of Charleston Neck* by John Diamond 1807 georeferenced with a modern aerial photograph.

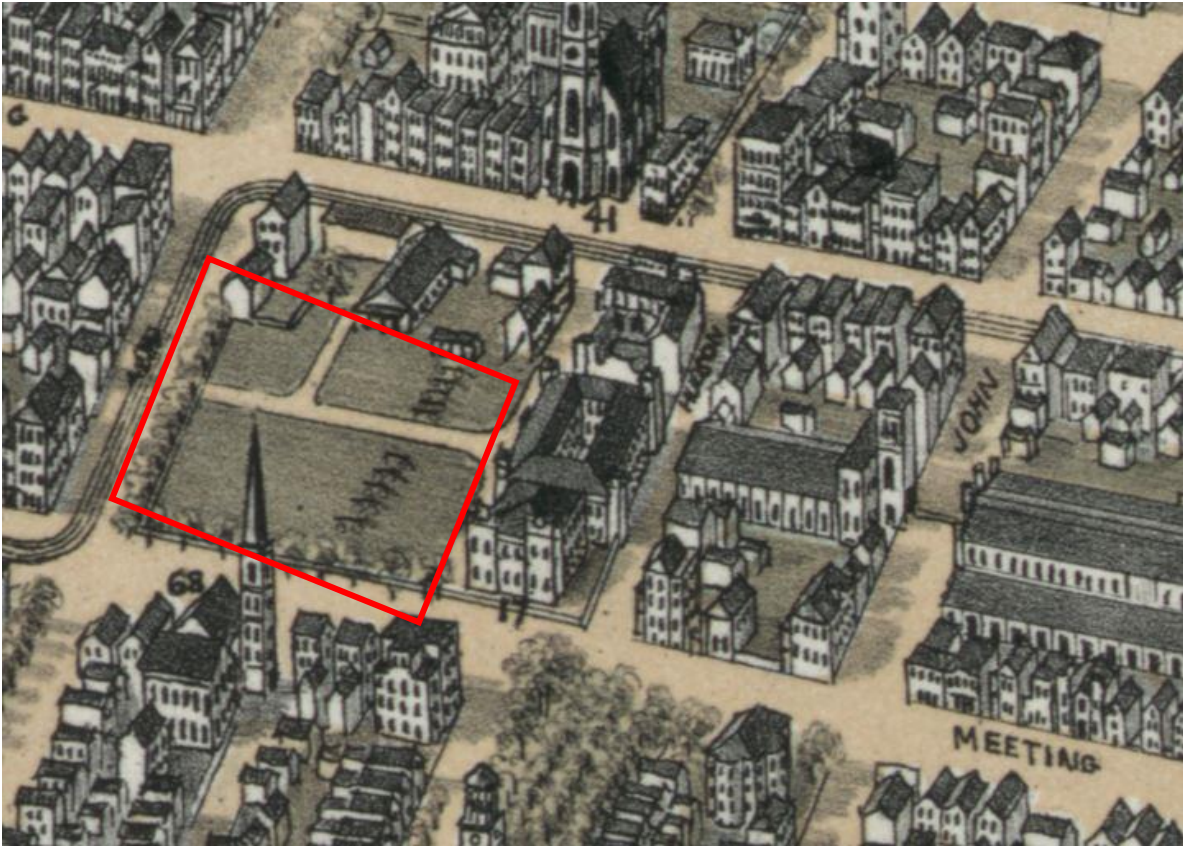


Figure 67: *Birds Eye View of the City of Charleston 1872*. Red box indicates Marion Square.

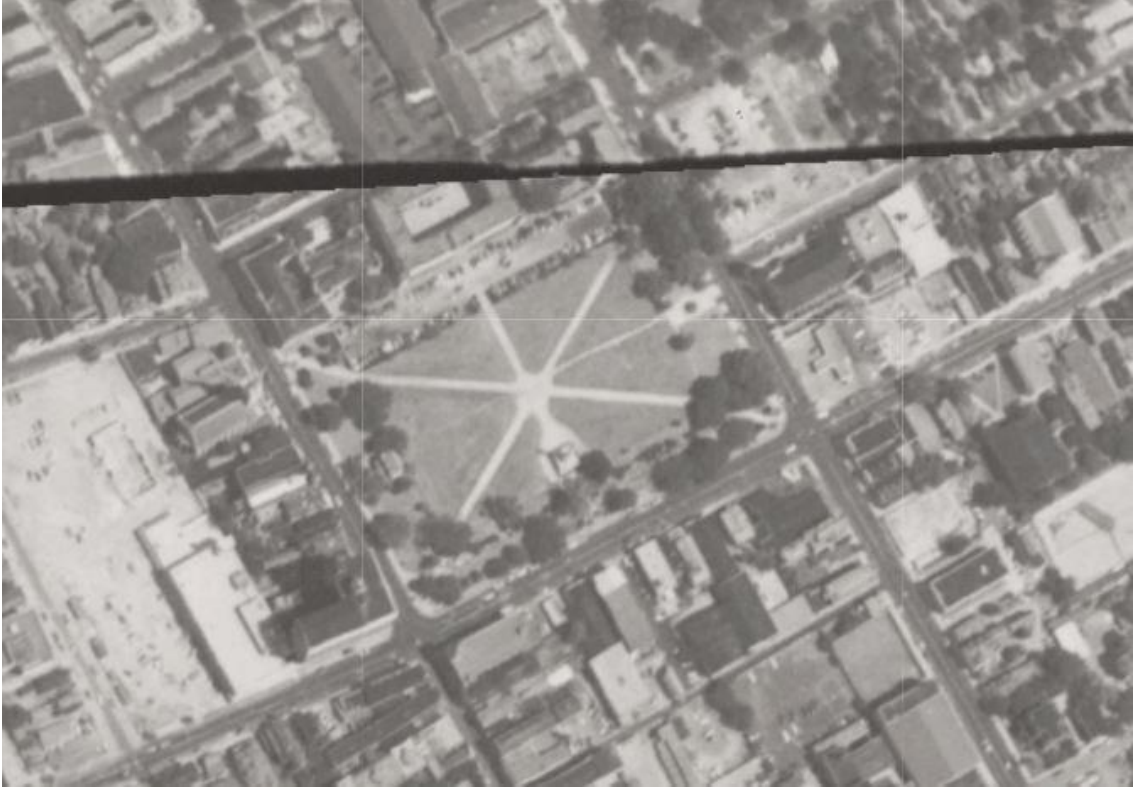


Figure 68: Aerial photograph of Marion Square in 1954. Courtesy University of South Carolina libraries.

Marion Square LiDAR Results

The LiDAR imagery of Marion Square shows that the area is on natural high ground (Figure 70). With the georeferenced Blaskowitz and Taylor maps on top of the LiDAR imagery, the hornwork was placed on high ground (Figures 71 and 72). The topography of this area was important as a key area in the defense of the city. To the south of the hornwork are low areas, signified by blue on LiDAR. These low areas are in alignment with the georeferenced Blaskowitz and Taylor maps placement of historic waterways. A portion of the south west portion of the hornwork is in a low area, which, according to both the Blaskowitzs and Taylor maps, a canal to fill the moat entered the area surrounding the hornwork. According to the LiDAR map, portions of the hornwork was under modern day Calhoun Street. The areas adjacent to the hornwork are also high areas.

The accuracy of the georeferenced maps is confirmed by the LiDAR because the historic waterways line up with low areas on the modern landscape. The placement of these low areas provides clues to the placement of a GPR grid.

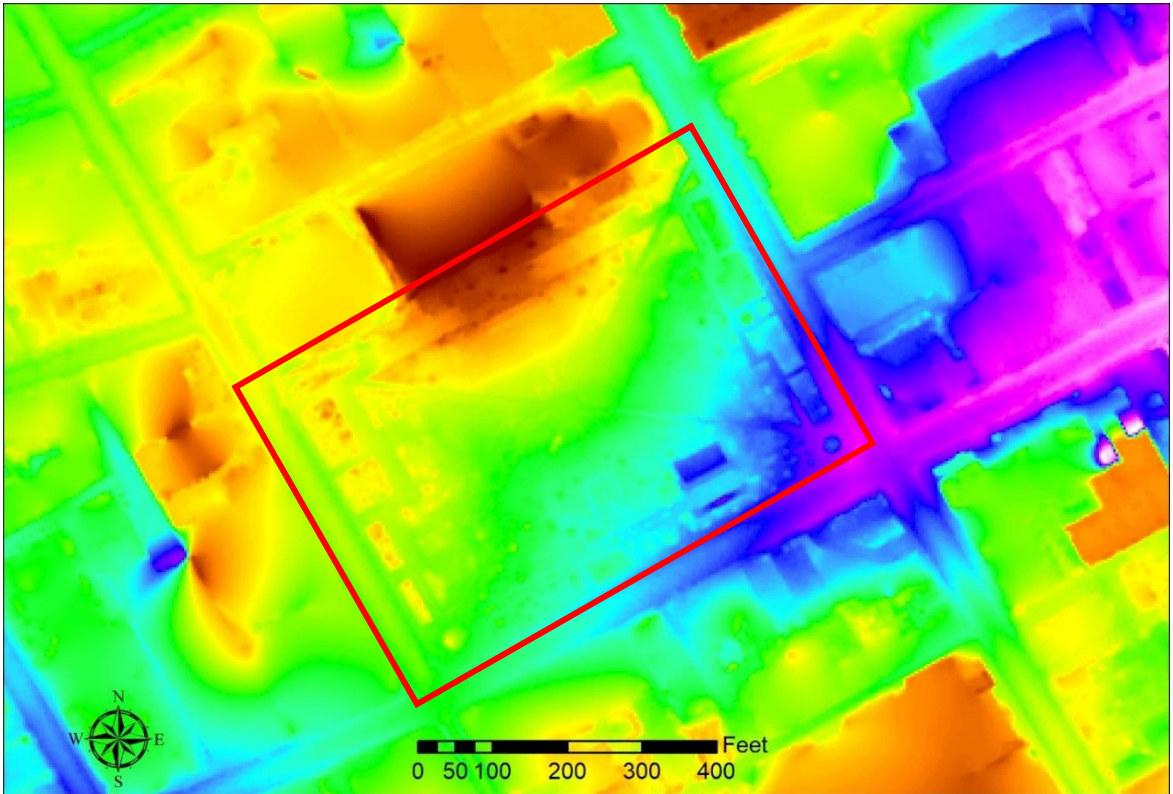


Figure 69: Marion Square shown with LiDAR imagery from NOAA.

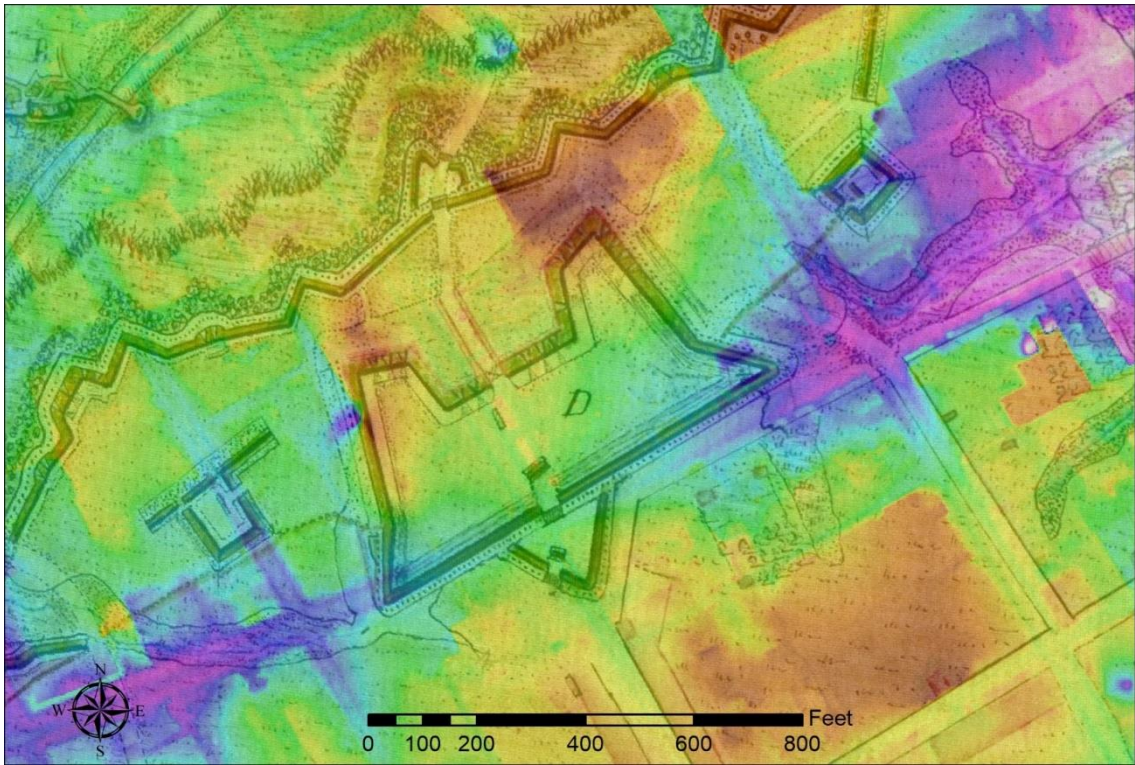


Figure 70: *Charles Blaskowitz Map 1780* overlaid on the NOAA LiDAR imagery showing the hornwork in Marion Square.

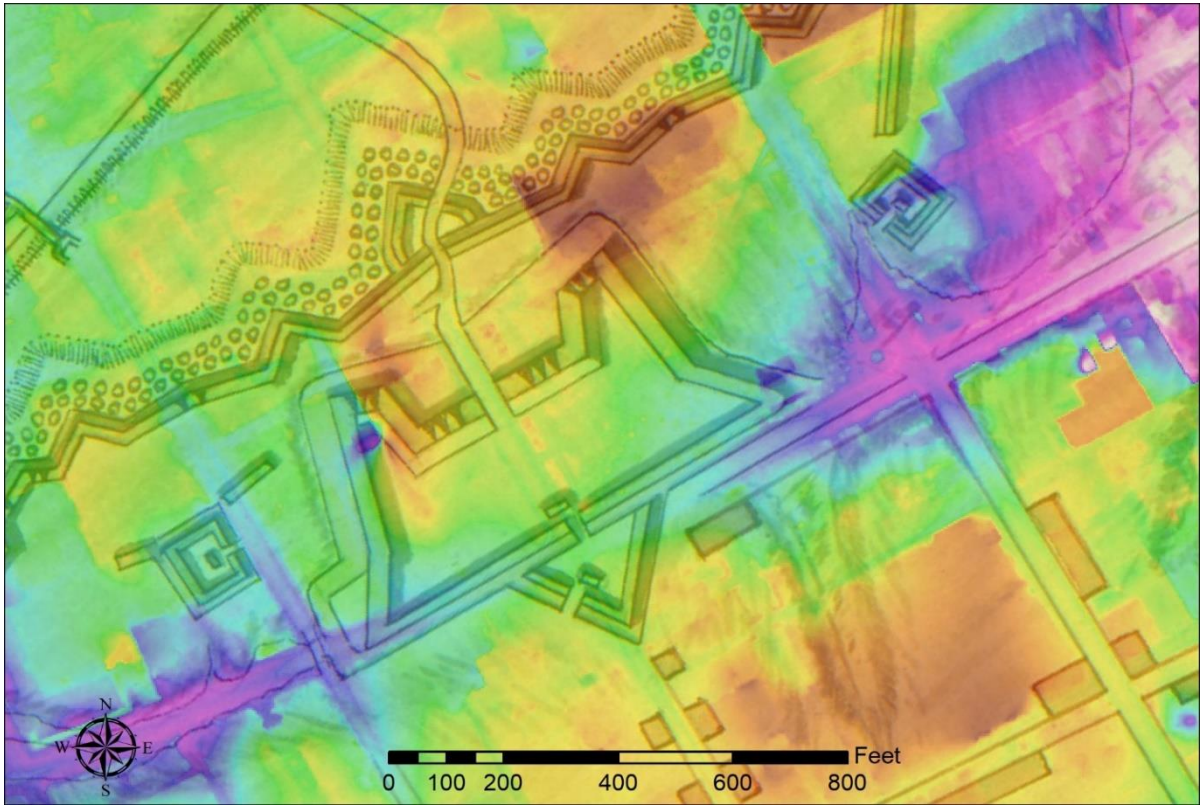


Figure 72: *George Taylor Map 1781* overlaid on the NOAA LiDAR imagery showing the hornwork in Marion Square.

Ground Penetrating Radar Results Marion Square

Based on previous research conducted by Carl Borick, Nic Butler, and the archaeological excavations by Natalie Adams, a GPR survey was conducted to outline the eastern portion of the hornwork (Figure 73). In February of 2020, Dr. Jon Marcoux and the Clemson Graduate Historic Preservation Program conducted ground penetrating radar to locate the eastern portion of the hornwork in Marion Square.¹²⁷ The Blaskowitz map placed half of the hornwork in Marion Square, and based on this information, the GPR survey area was chosen. The survey grids were laid out in several areas, and only encompassed the area where the Blakowitz map placed the hornwork. The survey started in the western side of the square and continued east until the area where the hornwork, as shown on the georeferenced Blaskowitz map, was covered. It was conducted by Jon Marcoux with the graduate students in Historic Preservation at Clemson University. The survey was commissioned by the South Carolina Battleground Preservation Trust for interpretation on the future “Liberty Trail.”

The GPR survey of Marion Square revealed features possibly related to the hornwork (Figure 73 and 74). In plan view, displayed here at 2.4 feet below the ground, the survey area matches up with the outline of the hornwork from the Blaskowitz map (Figure 74). The area is also impacted by modern utility lines. However, the utility lines appear to have missed the hornwork. The curtain wall of the horn work is over three hundred feet long and stretches from the southern end of Marion Square to the northwest

¹²⁷ Jon Marcoux GPR Survey of Marion Square unpublished work. 2020.

portion of Marion Square. The eastern “horn” of the fortification is located under Tobacco Street before it stretches southwest toward the tabby remains from the fortification. The rest of the hornwork is suspected to stretch to the west until it crosses over King Street, which is where the suspected drawbridge and entrance to the city once stood. This area on King Street was outside of the survey area.

The profile view of the hornwork is visible by two highly reflective areas. Feature one (Figure 75) is a the highly reflective area which follows the outline of the Blaskowitz map. The trench suspected to be associated with the hornwork is visible by a “V” shaped profile as seen in figure 76. This area appears as multiple high-amplitude point-source reflection hyperbolas indicating fill episodes. The fill episodes appear in a “V” shape at two and a half feet below the ground and around ten feet wide. The trench was likely deeper than what is seen in the profile view. In front of the “V” shaped trench is another area shown by more high-amplitude point-source hyperbolas, indicating the suspected tabby wall of the hornwork. The “V” shaped trench is right in front of the highly reflective area indicating tabby, which aligns with the suspected moat in front of the fortification.

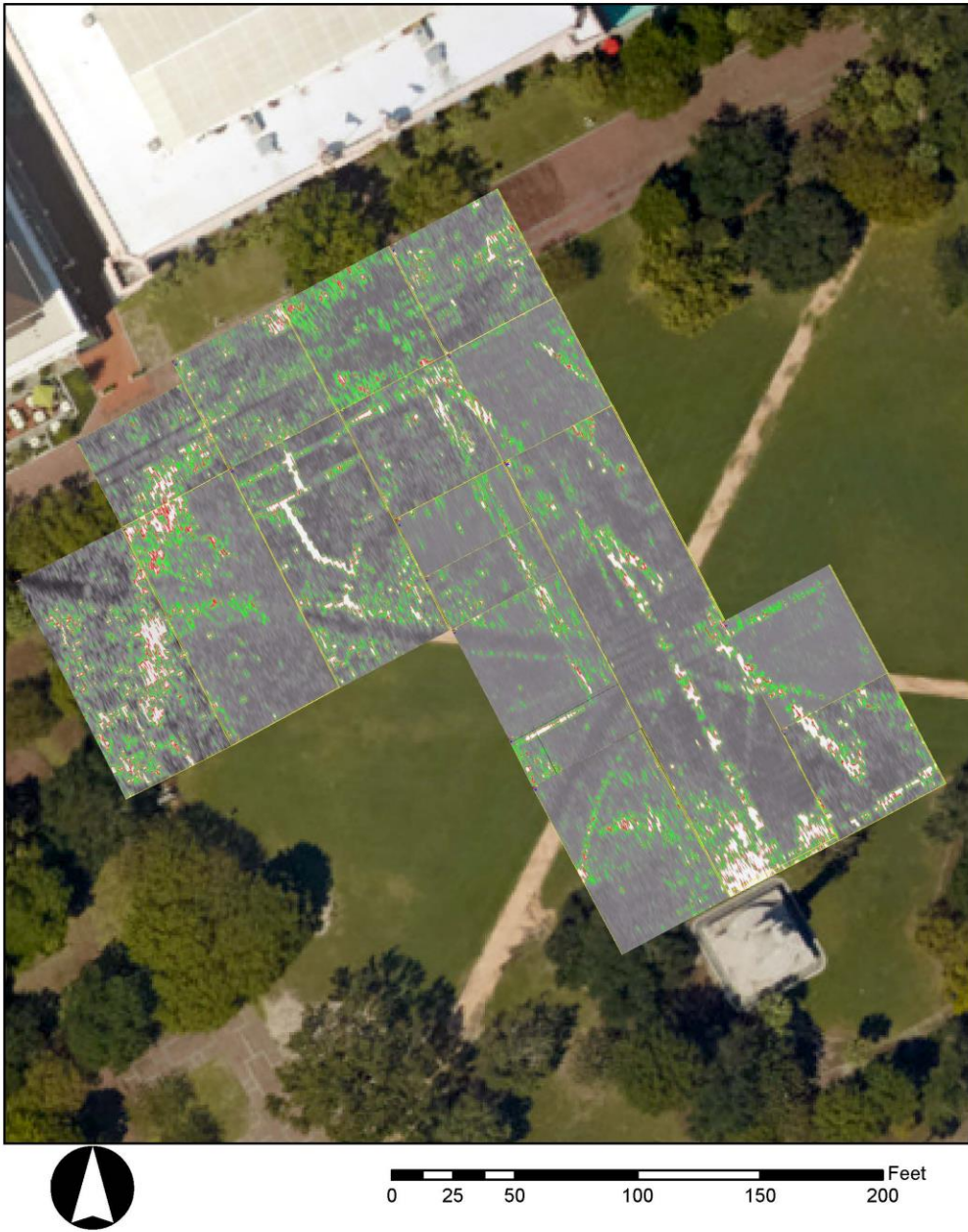


Figure 73: GPR plan view at 2.4 feet of Marion Square overlaid on a modern aerial photograph. Image courtesy Jon Marcoux.

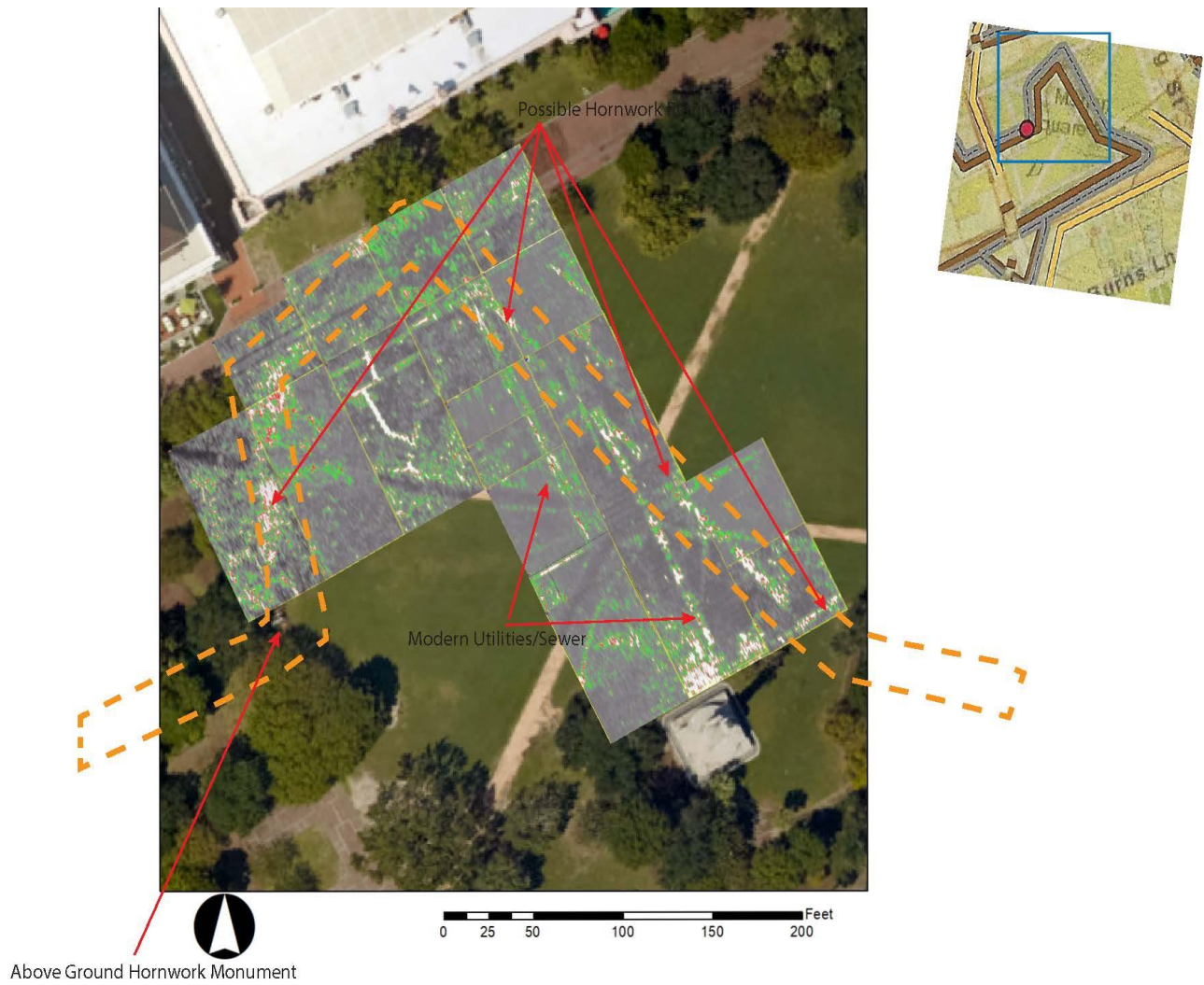


Figure 74: GPR plan view at 2.4 feet with hornwork highlighted.
Image courtesy of Jon Marcoux.

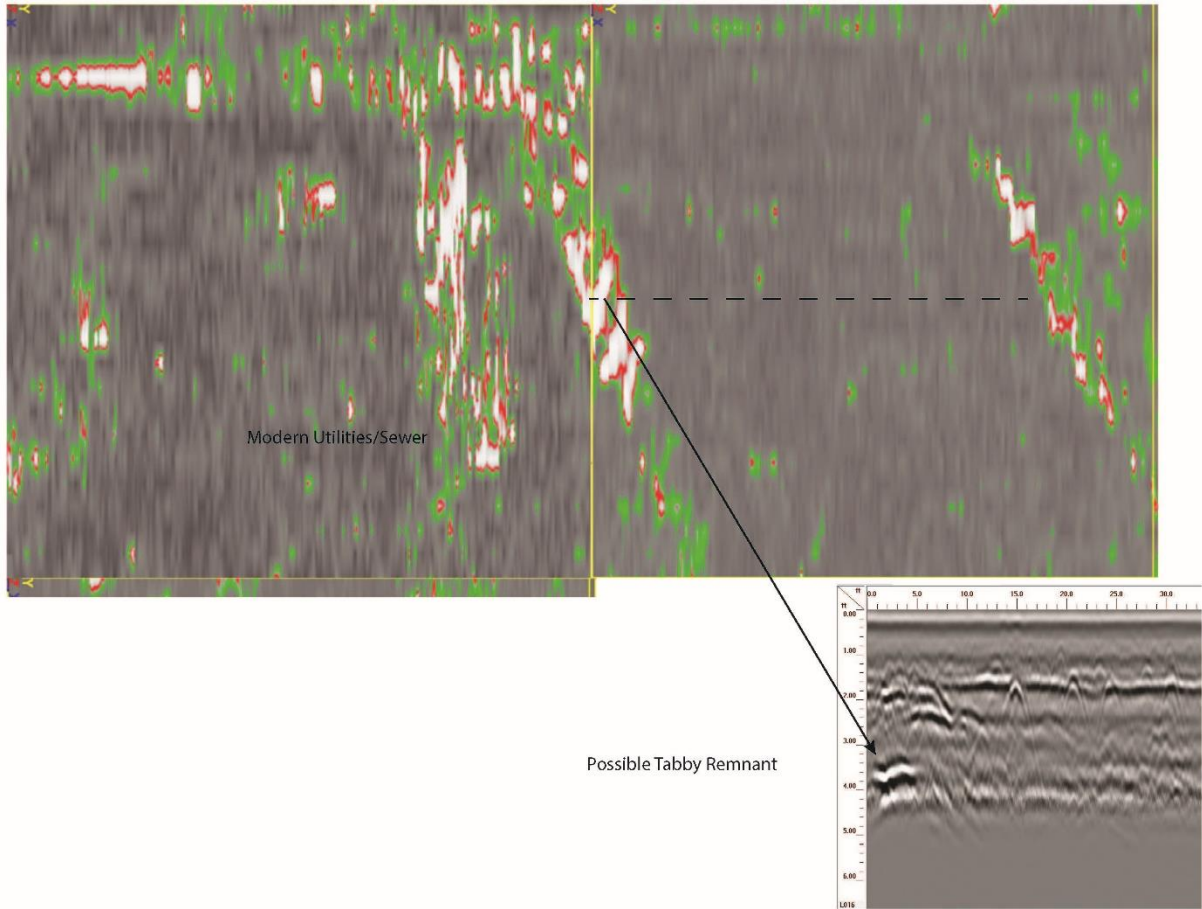


Figure 75: GPR plan view of tabby remnant, top photo.
Profile view of tabby remnant, bottom photo.

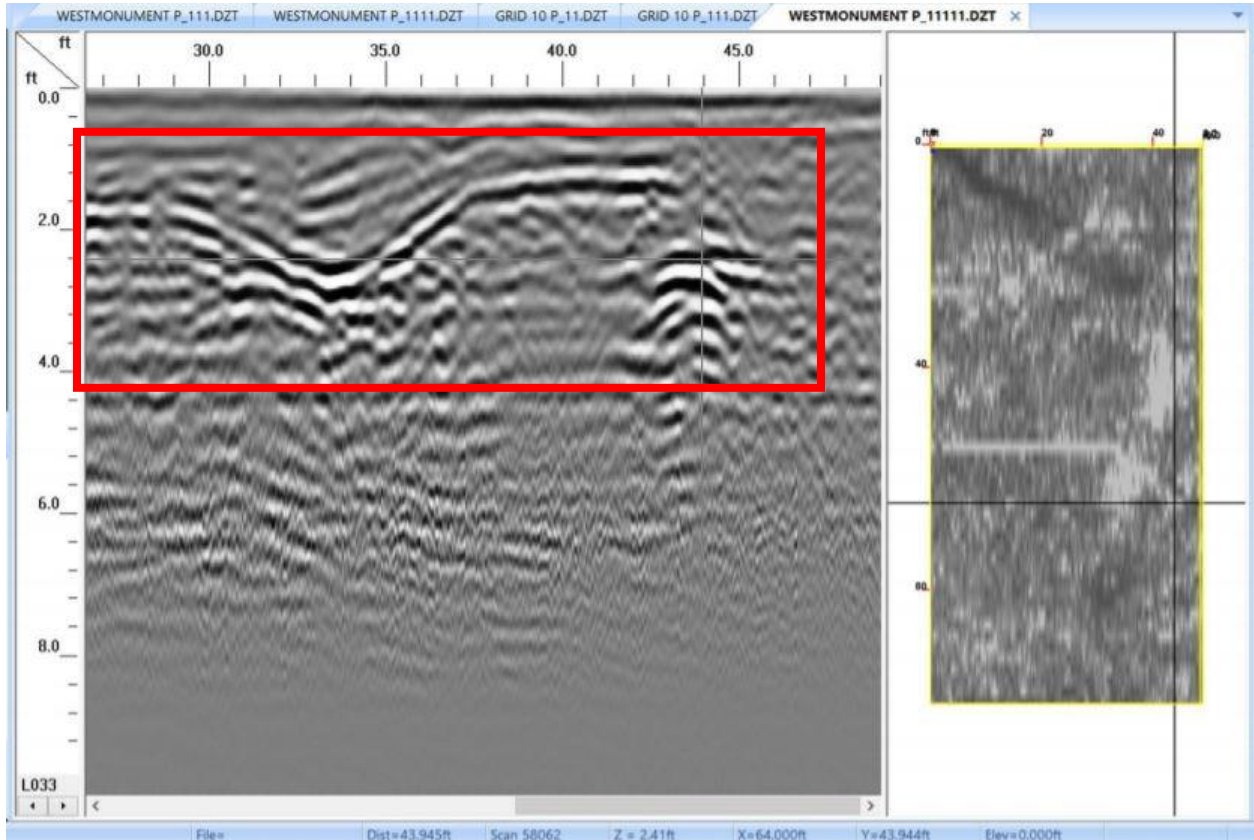


Figure 76: Profile of transect showing upside down “U” ditch feature. Image courtesy of Jon Marcoux.

Cistern Yard College of Charleston Campus

Historic Accounts

The Cistern Yard on the College of Charleston Campus is the location of an historic Revolutionary War era barracks. There were two complexes, one of them located in the western portion of the current Cistern Yard. Research into the Revolutionary War barracks began several years ago when Scholar-in-Residence at Addlestone Library, Harlen Green, found an old sketch drawing of the barracks online (Figure 77).¹²⁸ The sketch set off a search for the barracks at the College of Charleston.

The historic accounts of the barracks date to newspaper articles from the time of the renovation of the barracks for the college's use. The barracks are spoken about when the president of the college used enslaved labor to renovate the barracks for classrooms at the college.¹²⁹ These old Revolutionary War era barracks became the first buildings on the College of Charleston campus. Newspaper clippings from the early nineteenth century mention the college, which only consisted of the barracks at the time.¹³⁰ From these sources, it was determined that the old barracks were situated in the Cistern Yard. With this information, further research was conducted to determine if the foundation of the building was still below the ground.

¹²⁸ John Rubens Smith, “[View of the City of Charleston, South Carolina, with Homes and Outbuildings at Left and Right, and a Long Row of Brick Building, Perhaps Barracks, at Center],” image, Library of Congress, Washington, D.C. 20540 USA, accessed March 15, 2021, <https://www.loc.gov/resource/ppmscd.00061/>.

¹²⁹ Adam Parker, “From Barracks to Classrooms - Post & Courier, 5/10/2020,” May 10, 2020, <https://digital.olivesoftware.com/Olive/ODN/PostCourier/PrintArticle.aspx?doc=POCO%2F2020%2F05%2F10&entity=ar03400&ts=20200510055931&%E2%80%A6>.

¹³⁰ A.S. Willington, “Charleston Courier,” May 24, 1828, <https://infoweb-newsbank-com.cepl.idm.oclc.org>



Figure 77: *Drawing sketch of Revolutionary War era barracks on the College of Charleston campus.*

Cistern Yard Historic Maps and GIS

The georeferenced Blaskowitz map and Taylor map placed the barracks in the southwest portion of the Cistern Yard (Figure 78 and 79). The area is surrounded by creeks on the maps and is on relatively high ground. According to both the Blaskowitz and Taylor maps, the barracks were also longer prior to the renovation by the college and stretched past modern-day Randolph Hall. The Blaskowitz map depicts the barracks as thin lines. The Taylor Map places the barracks in the same area as the Blaskowitz map, but the buildings are depicted as denser (Figure 79). Since the barracks were a part of the College of Charleston Campus for several years, plat research revealed that the barracks were labeled “Charleston College.” Two plats, one done by Purcell in 1801 (Figure 80) and an undated McCrady plat (Figure 81), show the location of the barracks in the early nineteenth century.¹³¹ Since all plats and both historic maps place the barracks in the Cistern Yard, this means that the barracks remained in this area throughout the early nineteenth century. These georeferenced maps suggest that there have not been any major building campaigns in the area of the barracks since the Revolution.

According to research conducted by the College of Charleston, the barracks were demolished after 1824, when the then president of the college left his post, declaring that he would not return until a new building was built for the college.¹³² By 1828, Randolph

¹³¹ Joseph Purcell, *A Plan of College Lands*, McCrady Plat Collection 3713 (Charleston County Register of Deeds, 1801), Unknown, *No Name*, Undated, Plat, Undated, McCrady Plat 222.

¹³² Adam Parker, “From Barracks to Classrooms,” *Post and Courier*, May 10, 2020.

Hall was built, and the barracks were demolished.¹³³ *The Bird's Eye View of Charleston* from 1872 also indicated no major building campaigns to the area of the barracks in the western half of the yard (Figure 82).¹³⁴ In 1954, aerial photographs also show no major building campaigns in the western portion of the yard, where the georeferenced maps placed the barracks (Figure 83). All Sanborn Maps also show no major building campaigns in the area.¹³⁵ The lack of major building campaigns to the spot where the barracks were once located means that there is a greater chance a foundation, builders' trench, or a potential chimney foundation below ground.

¹³³ Adam Parker, "From Barracks to Classrooms," *Post and Courier*, May 10, 2020.

¹³⁴ Drie, "Bird's Eye View of the City of Charleston South Carolina 1872 / C. Drie, Lithographer."

¹³⁵ *Sanborn Fire Insurance Maps* (Charleston, SC, 1888-1955), Plate 41, https://fims-historicalinfo-com.ccpl.idm.oclc.org/FIMSSD.aspx?m=08124_1888.



Figure 78: Blaskowitz map overlaid on a modern aerial photograph, showing the barracks.

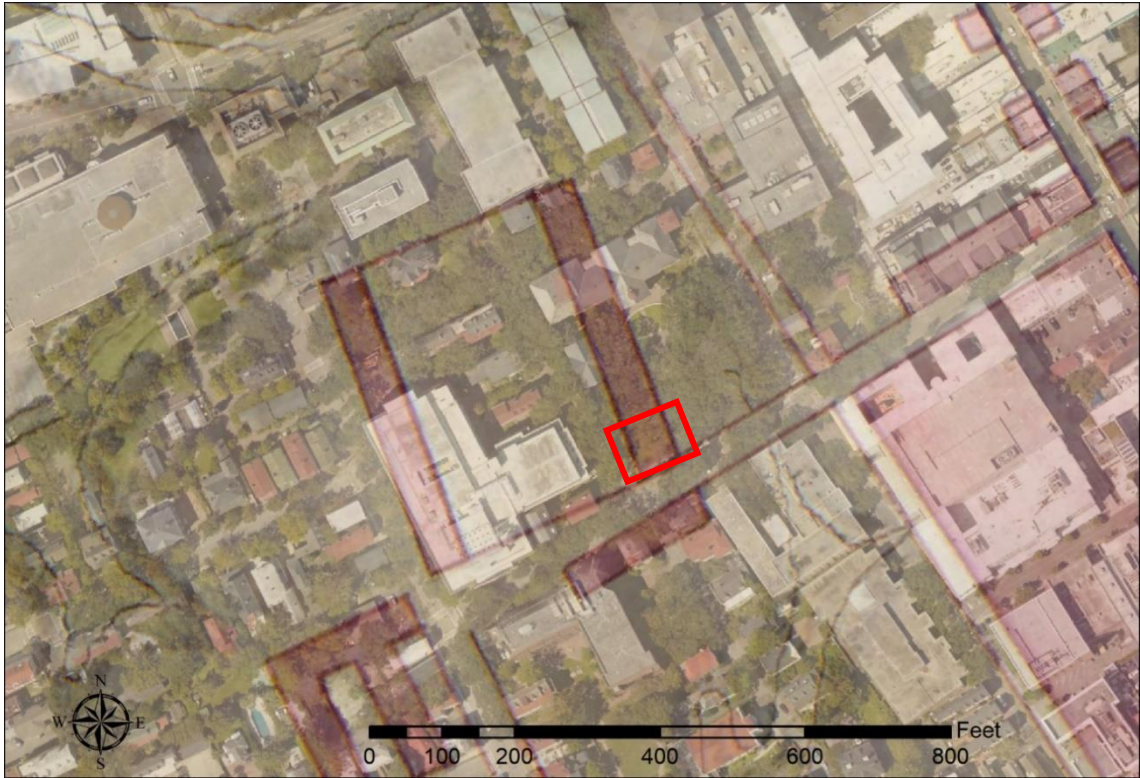


Figure 79: George Taylor Map depicting the Cistern Yard overlaid a modern aerial photograph.

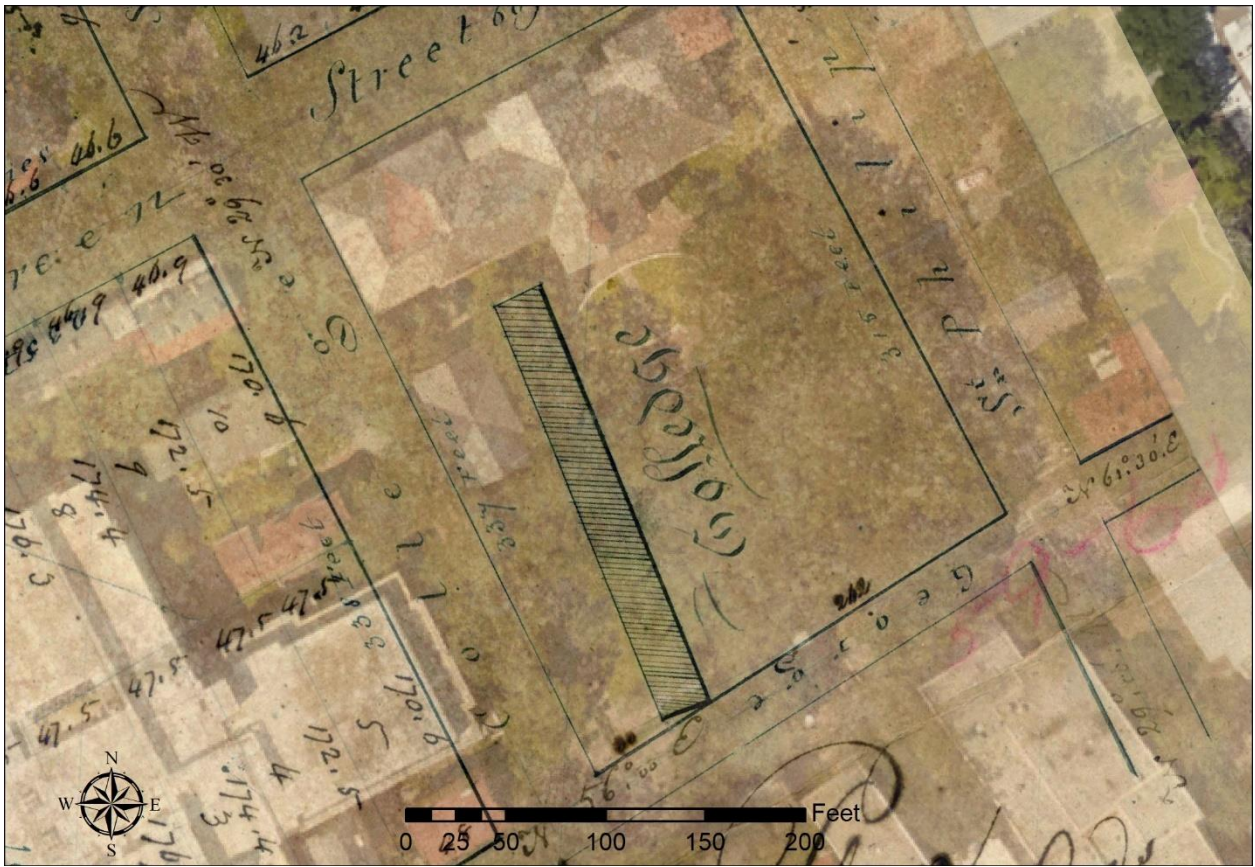


Figure 80: McCrary plat 3713 of the McCrary Plat Collection. Drawn by Purcell in 1801.

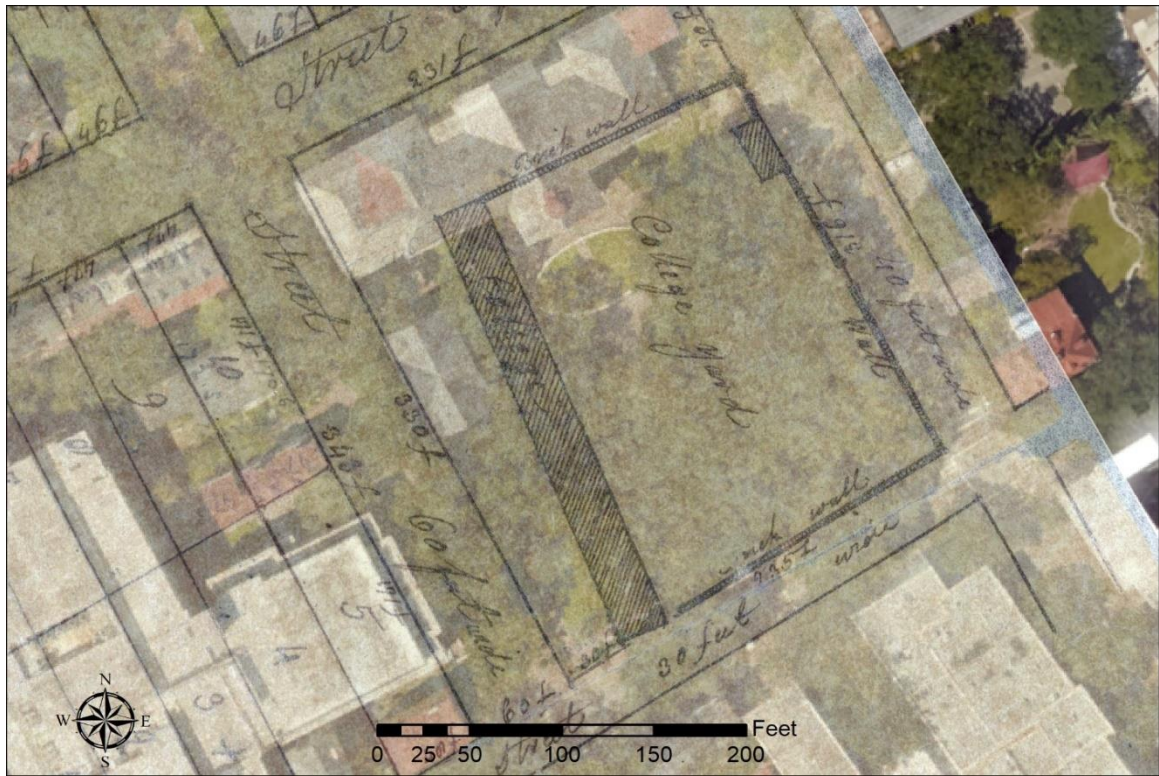


Figure 81: McCrady plat 222 overlaid on a modern aerial photograph. Undated.

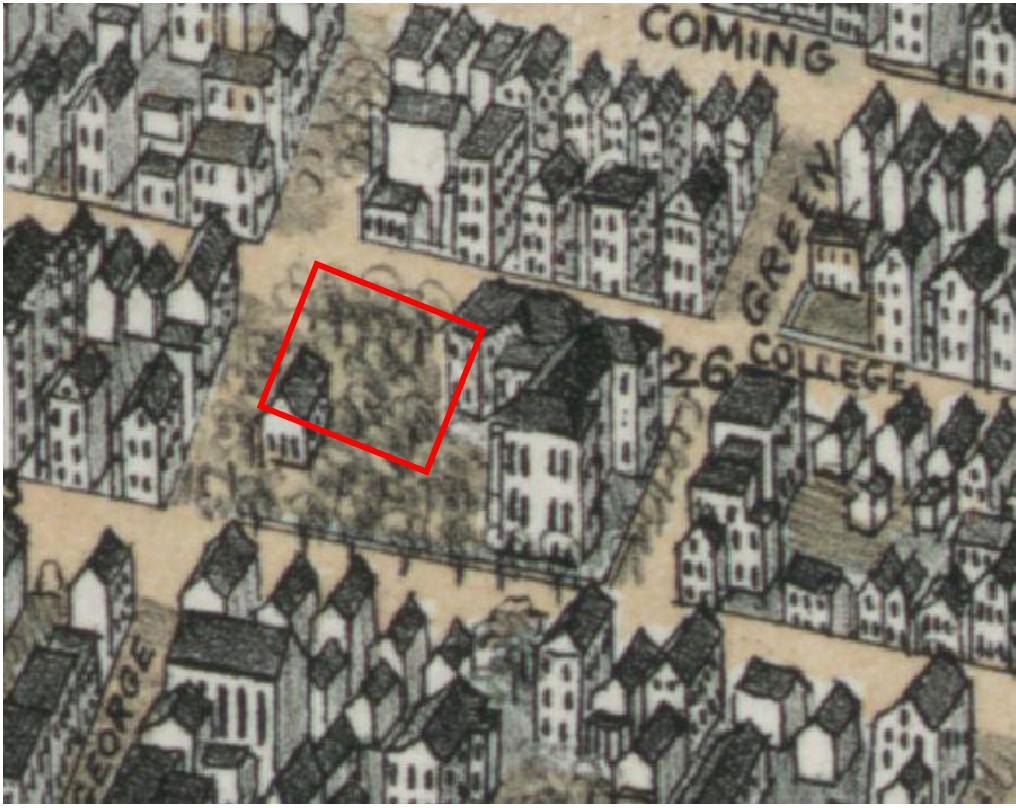


Figure 82: 1872 *Bird's Eye of Charleston* showing the Cistern Yard and survey area on the College of Charleston Campus.



Figure 83: 1954 aerial photograph showing the Cistern Yard and the survey area.

Cistern Yard LiDAR Results

Several observations are made from the Taylor map overlaid with the LiDAR imagery (Figure 84). The eastern barracks are on the western side of the Cistern Yard. This area appears in the LiDAR with yellow and red topographic imagery signifying high ground. Above the barracks, to the north of the Cistern Yard, the LiDAR imagery appears to show low areas, as signified by the linear blue area. This linear blue area lines up with an historic creek or canal as drawn on the Taylor map. To the west, an historic creek as seen on the Taylor map aligns with modern-day low ground as signified by the blue area (Figure 86). Blaskowitz also drew a creek to the west of the Cistern Yard, however, the area is drawn in a slightly different way from Taylor's (Figure 85). To the south of the Cistern Yard is another area drawn as a creek by both Blaskowitz and Taylor. The LiDAR imagery aligns with these areas showing low ground where the historic creeks were. To the east is more high ground, signified by the red areas, and where both Blaskowitz and Taylor place buildings. Since the barracks appear on high ground from the LiDAR perspective and surrounded by creeks on the Taylor and Blaskowitz maps, the conclusion is that the area of the Cistern Yard was historically high ground, as it is today. The high ground in the Cistern Yard, in alignment with the Blaskowitz, Taylor and McCrady plats, indicates that the placement of the barracks was most likely where the georeferenced maps have placed them.

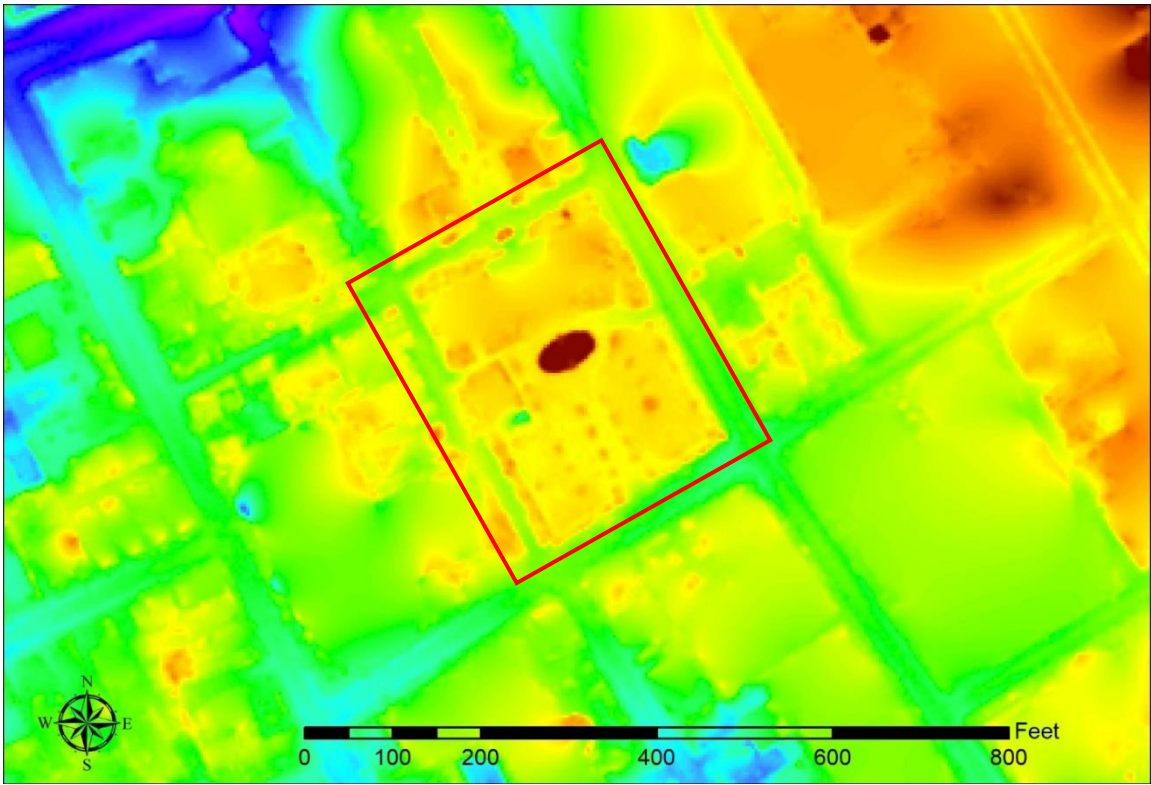


Figure 84: Cistern Yard LiDAR from NOAA

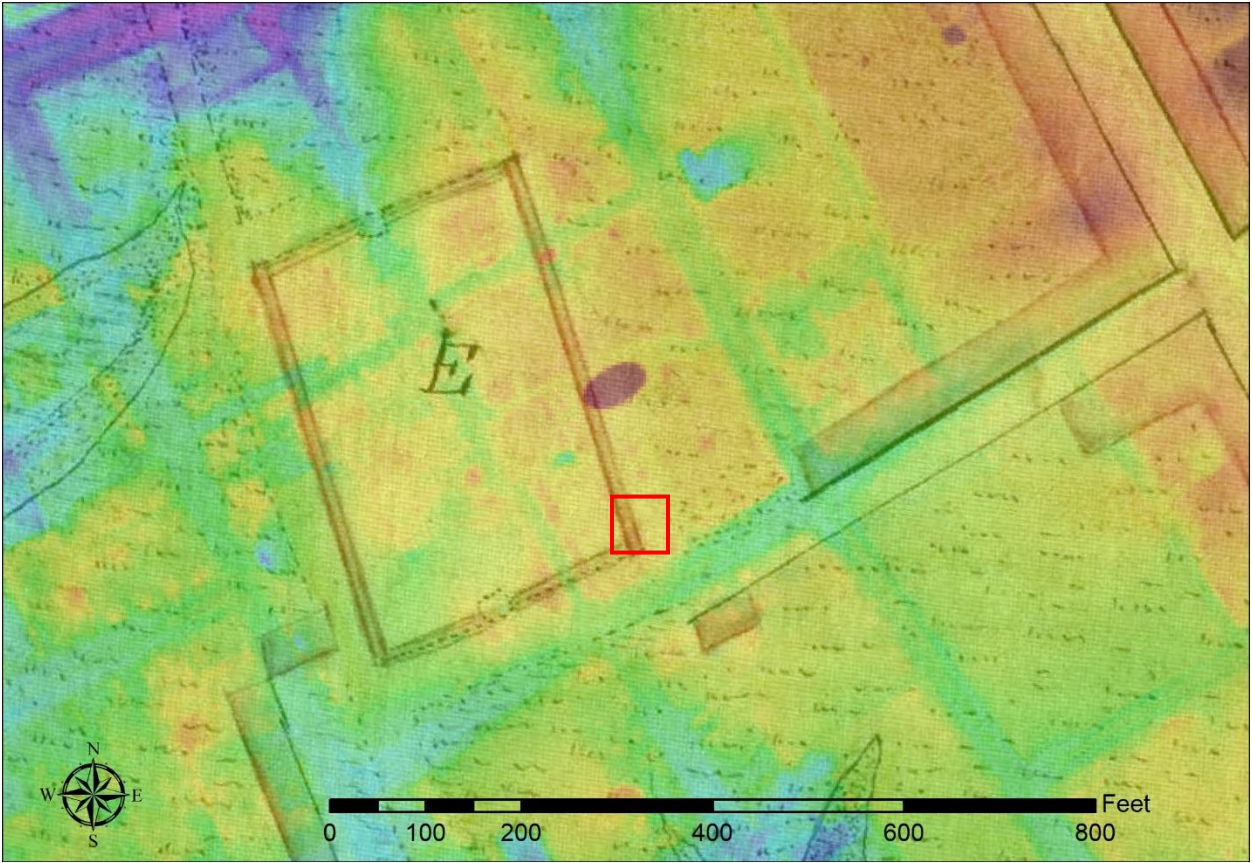


Figure 85: Cistern Yard LiDAR with Charles Blaskowitz Map overlay.

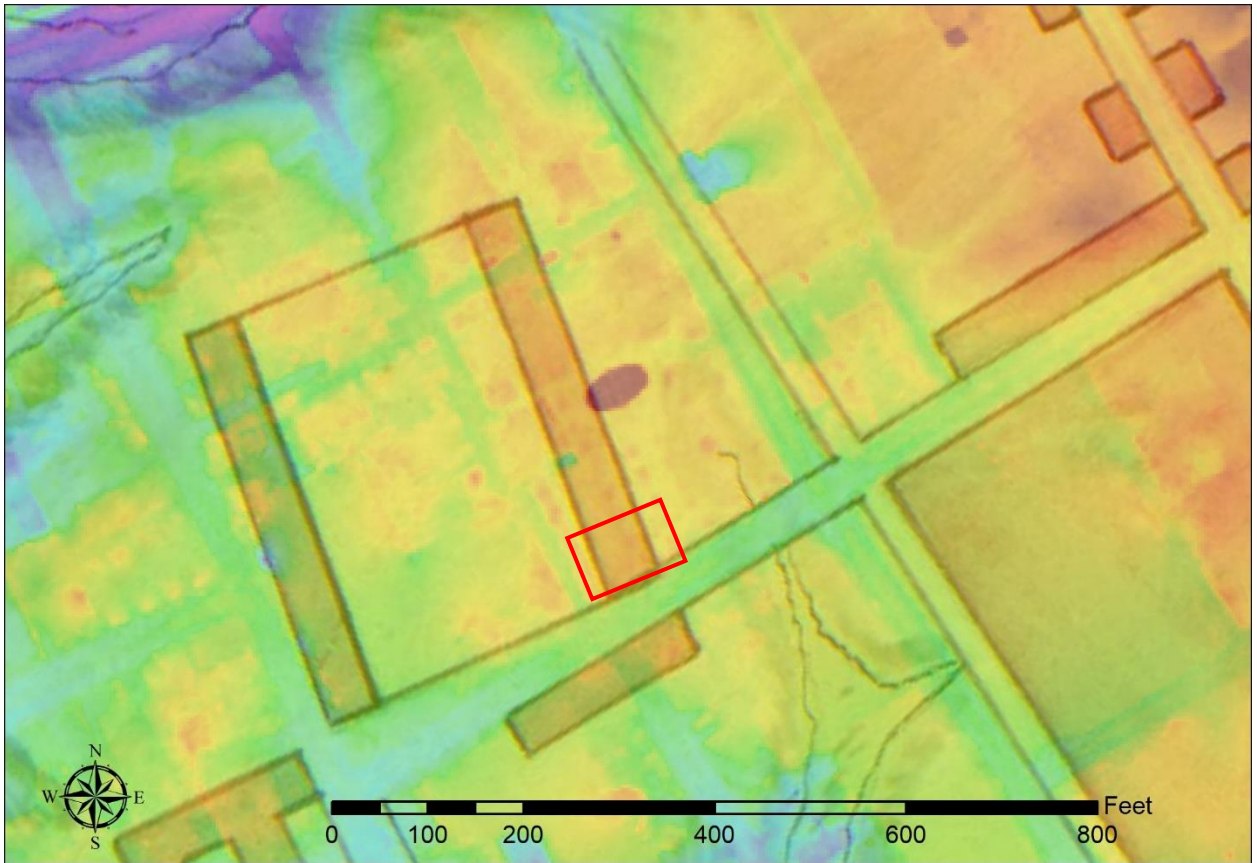


Figure 86: Cistern Yard with Georg Taylor map overlay.

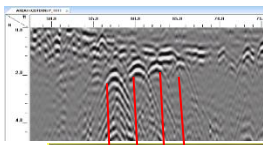
Ground Penetrating Radar Results in the Cistern Yard

The GPR survey in the Cistern Yard occurred in the south western corner of the yard and continued north toward Randolph Hall. The transects were run west to east every two feet. The survey grid began in the furthest most corner of the green on the western side and ran eighty-five feet east-west by ninety feet north-south. The baselines ran ninety feet north-south in the survey grid. The survey area was obstructed by a tent and barrels of water used to hold the tent down, in addition to chairs on the northern side of the tent. To accommodate the tent, barrels, and chairs, the transects ran around these areas.

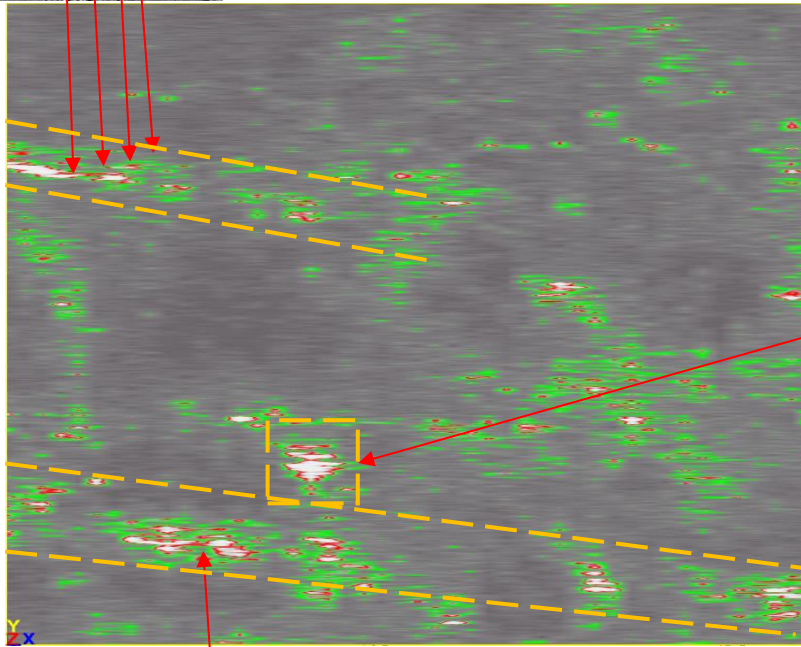
The plan view of the Cistern Yard is at four and a half feet below the ground (Figure 87 and 88). There are a few features reflected on the plan view which show up as areas of high reflectivity, indicated by areas of red, green, and yellow. Feature one runs north-south eighty feet in a linear orientation but is disrupted at forty feet, continuing at eighty feet and beyond the survey area. Just to the east is a square feature which is ten feet wide by ten feet wide. In the eastern portion of the survey area, another linear feature runs north-south.

In profile, feature one is a flat undulating planar reflection (Figure 76, feature 1), with multiple high-amplitude point-source reflection hyperbolas. The flat undulating planar reflection indicates fill episodes with an item that is flat, such as brick rubble. The high-amplitude point-source reflection hyperbolas continue through the entire survey area and are about three feet wide and at three and a half feet deep below the surface. The

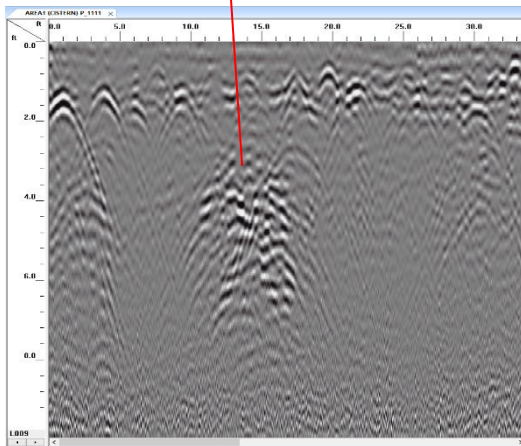
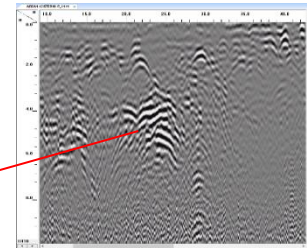
profile data, along with the plan view suggests a possible filled builder's trench. The reflection, indicating rubble fill, is consistent with the demolition of the building and recycling (i.e. "robbing") of brick. Feature two (Figure 87) is a flat undulating planar reflection, indicating rubble such as brick. This feature is consistent with a potential chimney base. Feature two, the potential chimney base, is not linear and is just clustered in one area. The former military barracks did have multiple chimneys, which were required for eighteenth century heating. The undulating planar reflections of feature two in just one small cluster raise the potential that this is a chimney base; however, this cannot be proven without further archaeology. The fact that all of the historic features are three and a half feet to four feet below ground means that this is a potential foundation that was excavated for the stability of the building. Finally, based on the George Taylor map, plats, and Blaskowitz map, there is a high potential that the linear planar reflection in the western side of the Cistern Yard is the former foundation of the military barracks. Further ground truthing would be needed to test this hypothesis. Feature three on the far eastern side of the survey grid is indicated by four linear hyperbolas over multiple transects. This is a potential modern utility line and may be connected to the Cistern itself or another surrounding building.



Feature 3: Four utility pipes.



Feature 2: Possible chimney bases.



Feature 1: Possible brick foundation.

Figure 87: Plan view of the south west corner of the Cistern Yard with areas of high reflectivity.

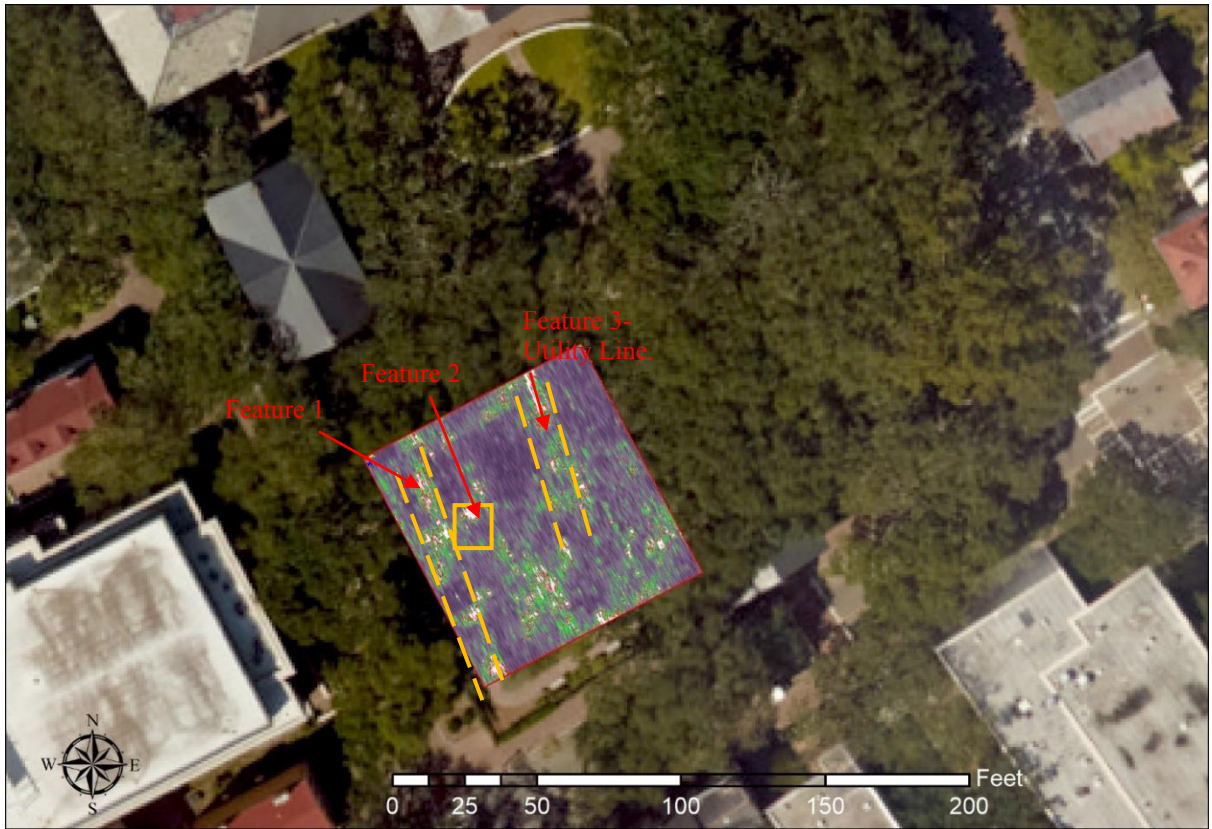


Figure 88: GPR Survey plan view at four and a half feet below ground.

CHAPTER FIVE: CONCLUSION

The success in locating the areas important to this thesis depended upon the georeferenced Blaskowitz and Taylor maps of the Charleston peninsula from the Siege of 1780 and the following year. Historic accounts from the time of battle supported the findings from these two georeferenced maps. From this information, six areas were identified for a ground penetrating radar study. These areas provided a variety of features for the GPR survey. The georeferenced Blaskowitz and Taylor maps showed that they were either in public parks or in wide empty spaces, such as a parking lot. From the areas studied, three areas in the northern portion of the peninsula provided inconclusive evidence. While three other areas provided compelling evidence of the siege. The results varied in each area depending on land-altering building campaigns and the placement of utility lines since the Siege of Charleston. The survey areas which showed compelling evidence of possible features revealed highly reflective features on ground penetrating radar.

Each area surveyed found disturbance below ground, but whether they are related to the siege can only be determined through archaeology. The georeferenced maps of Wragg Mall showed evidence that the feature once in this area was large, signifying a battery. This means that the large feature once located in Wragg Mall was an amorphous feature in relation to straight line defense trenches later seen in Wragg Square. In the survey areas on Hampstead Hill, including the Trident Technical College parking lot and the Cigar Factory parking lot, the lack of clear evidence can be attributed to heavy development in this area over time. This was a highly industrial area, and the evidence of

the siege may have been erased due to the heavy development through the Industrial Age to modern times. The area in Wragg Mall showed little development through the map chronology according to Sanborn Maps. However, the GPR revealed the placement of utility lines in the northern and southern portion of the park, which also happened to be where the georeferenced maps placed the historic trench features. When the ditch was dug to place the utility lines, the disturbance to the soil possibly erased remaining evidence of siege trenches.



Figure 89: *Siege of Charleston*, by Alonzo Chappel, c. 1862.

Three other areas surveyed by GPR included Wragg Square, Marion Square, and the Cistern Yard on the College of Charleston campus. Each of these areas were related to the American defense of the city. These areas were all chosen based on the

georeferenced Blaskowitz and Taylor maps. Also, according to Sanborn Maps, these areas showed no major building campaigns to the survey areas through the map chronology. The feature in Wragg Square was a major portion of the defense line which was a significant prominence in the city at the time. The GPR uncovered evidence of location, orientation, and size of a “V” shaped well-defined feature below ground. The feature seen on the GPR survey is a ditch and berm system that aligns with the georeferenced defense line as seen on the Blaskowitz and Taylor maps.

The feature in Marion Square revealed a foundation of tabby of high reflectivity on GPR. The area in Marion Square was easy to locate because it was in an area of little disturbance below ground and revealed a clear line of tabby in the correct size, orientation, and location according to the georeferenced maps. The area in the Cistern Yard of the College of Charleston Campus was located based on georeferenced maps and previous research conducted by scholars at the college. The georeferenced maps placed a barracks building where troops stayed during the siege. The GPR revealed an area of high reflectivity below ground which aligns with the barracks on the georeferenced Blaskowitz and Taylor maps. The location, size, and orientation of the feature to the two maps give compelling evidence that the feature is the possible barracks as shown on the Blaskowitz and Taylor maps.

Opportunities for Further Studies

There are several ways in which future research can build upon the results of this thesis. During the research into this thesis, two previously unstudied maps were

identified. Both were drawn by George Taylor. The first map was a draft of the siege operations, drawn during the Siege of Charleston in 1780.¹³⁶ The map covers a wide area and provides information about troop placement and batteries placed outside of the peninsula. The second map by George Taylor was completed after the siege, in 1781.¹³⁷ This map shows extra fortifications built after the siege on the peninsula. The evidence that these new fortifications were built after the siege are in a plat by John Diamond in 1780.¹³⁸ Diamond drew “old fortifications” on his plat which align with the Taylor maps placement of new fortifications built by the British in 1781. The John Diamond plat was previously studied by Carl Borick and his colleagues, and it has been previously noted that the fortification aligns with another historic map, the Scavenius map.¹³⁹ Further research, archaeology, and ground penetrating radar, would be needed in order to see if these old fortifications still remain.

An area located to the west of the peninsula on “Albermarle Point,” formerly Fenwick’s Point, is the location of a former battery placed by the British during siege operations in 1780.¹⁴⁰ The LiDAR scan of the area pinpointed a higher elevation portion of the backyard of a private residence that aligns with the historic George Taylor map. Upon further investigation and a visual inspection of the area, a portion of this backyard is in the shape of a battery as depicted on the Taylor map, which historically may be the

¹³⁶ Taylor, “Plan of Charlestown 1781 / Surveyed & Drawn by George Taylor.”

¹³⁷ Wilson and Taylor, “Plan of the Town and Neck of CharlesTown.”

¹³⁸ From the Collections of the South Carolina Historical Society.

¹³⁹ Borick et al., *Searching for the 1780 Siege of Charleston: History, Archaeology and Remote Sensing*, 11.

¹⁴⁰ Borick, *A Gallant Defense*, 64.

battery placed in 1780. Only ground truthing and archaeology would prove if this raised area was the historic battery located on Fenwick's Point. Another area for further study is located on Shute's Folly Island. The georeferenced George Taylor map of 1781 placed a battery on Shute's Folly in the vicinity of the early nineteenth century fort, Castle Pickney. Archaeology on the site would reveal if the foundation of Castle Pickney is the former foundation of the British battery erected after the siege.

In each GPR survey area where evidence to the siege of Charleston was inconclusive, further archaeology and ground truthing would provide evidence as to whether or not any artifacts remain from the American Revolution. For these sites containing compelling evidence of the siege, such as Marion Square and Wragg Square, ground truthing archaeology would date the sites, which would provide possible conclusive evidence to the siege. The area located in the Cistern Yard believed to be a foundation of the former barracks would benefit from further archaeology in order to see if it is the foundation of the former barracks.

The GPR conducted in Marion Square revealed compelling results of a possible hornwork feature. However, the GPR into Marion Square can be added to in the future. More GPR should be conducted further east of where the tabby wall was found, to see if there is a trench associated with the tabby feature. GPR conducted further north along Tobacco Street to locate the rest of the eastern horn would be beneficial as well. Finally, a GPR study along King Street, next to Marion Square might reveal the location of the former city gate.

Prior to this thesis, the defense line in Wragg Square was unidentified. Currently, there is advocacy to create a “liberty trail” which would educate visitors as to the exact locations of the fortifications. The liberty trail would be enhanced by a stop in Wragg Square to show where the defense works were located and how it was oriented, according to the GPR survey. The education and understanding of these areas are necessary to their survival and to excite the public on knowledge of the Siege of Charleston in May of 1780.

Another area identified in the georeferenced Blaskowitz and Taylor maps is the East Bay curtain wall and Craven’s bastion. While these areas were originally related to the late seventeenth century walled city, they also played a role in the Siege of Charleston, because these defenses protected Charleston from the harbor. Craven’s bastion has previously only been identified on georeferenced maps, and a GPR survey of the area is needed to see if the fortification remains under ground. The location of Craven’s bastion is necessary to understanding the how the Siege of Charleston played out on the harbor side of the peninsula.

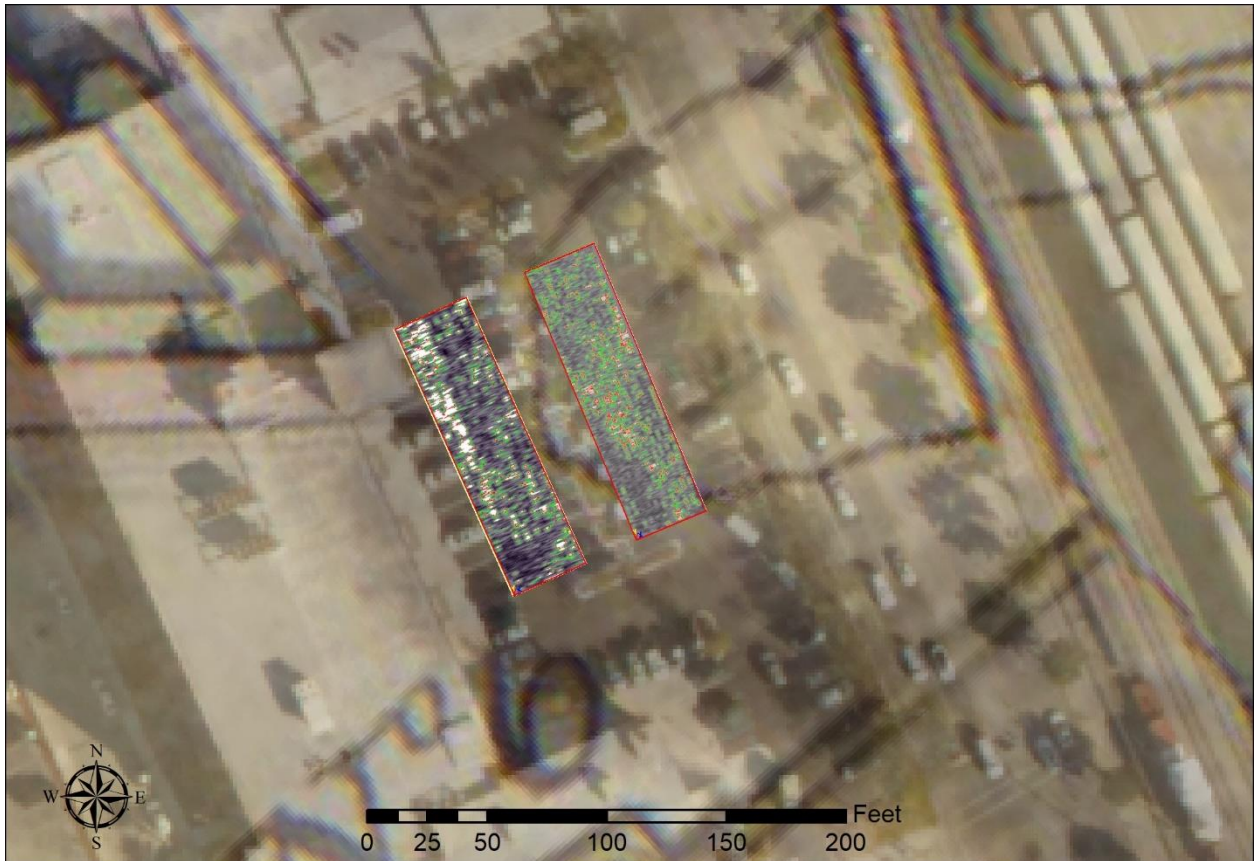
In a few areas, evidence of the Siege of Charleston in 1780 can be seen. However, all areas are threatened by the rapidly growing peninsula and modern-day development. An ordinance that requires studies like this one and archaeological investigations would go far in identifying and providing protection to these valuable historic resources. This way an archaeological survey would be conducted before any ground disturbing activities. If modern development continues without prior archaeological studies, any education related to the siege would be gone for future scholars. Since the Siege of

Charleston in 1780 was a significant battle in the American Revolution and a turning point in the war, these areas deserve to be preserved and saved for the future. Historic areas all over the Charleston peninsula are being eliminated due to the growing demand of real estate. When the siege took place in 1780, the soldiers of the British and American armies both played a significant role in altering the landscape of the peninsula. The altered landscape painted a picture of eighteenth-century warfare. The preservation of these areas is important to our modern understanding of how this battle played out and how the siege trenches and defenses were built. Furthermore, these areas played a significant role in the development of America and deserve to be protected and preserved.

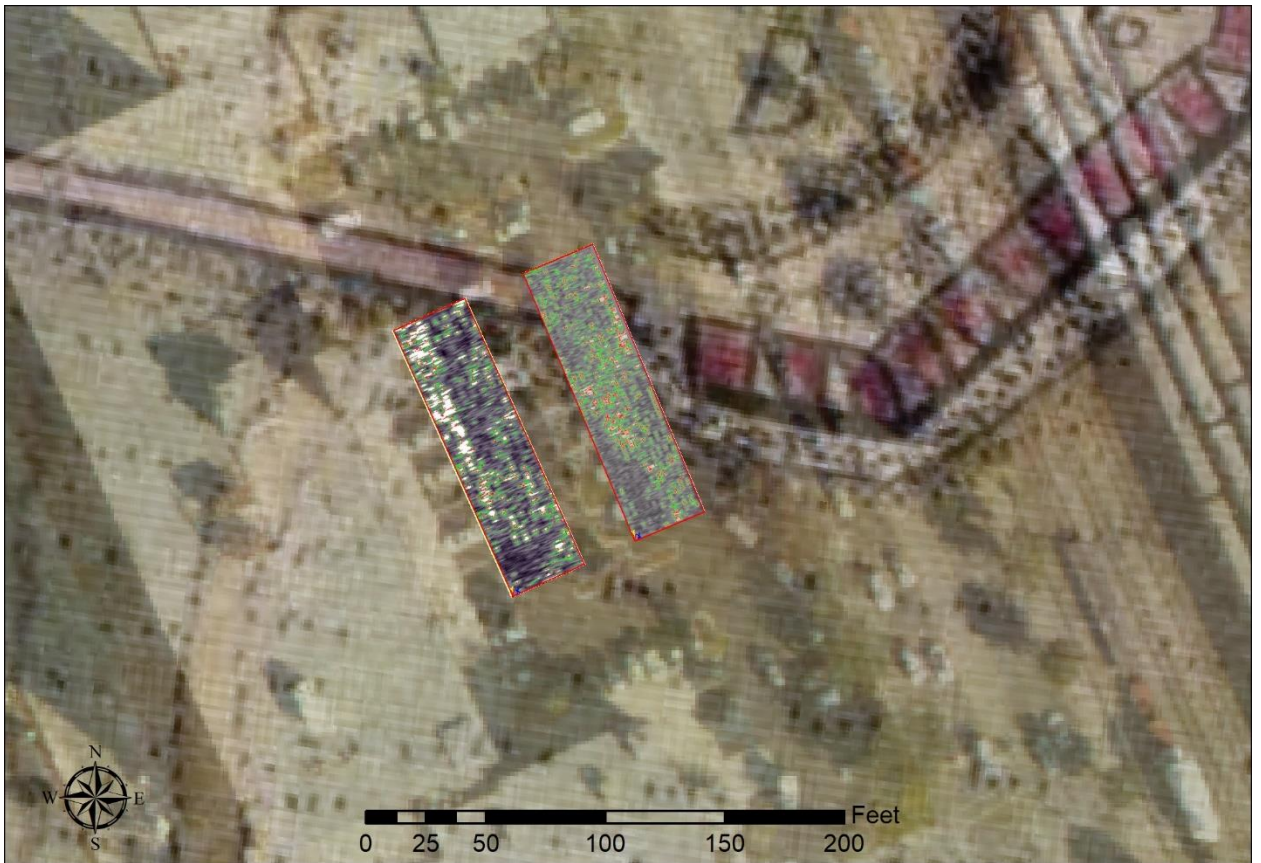
APPENDICES

Appendix A: GPR Overlays with Modern Aerial Photos

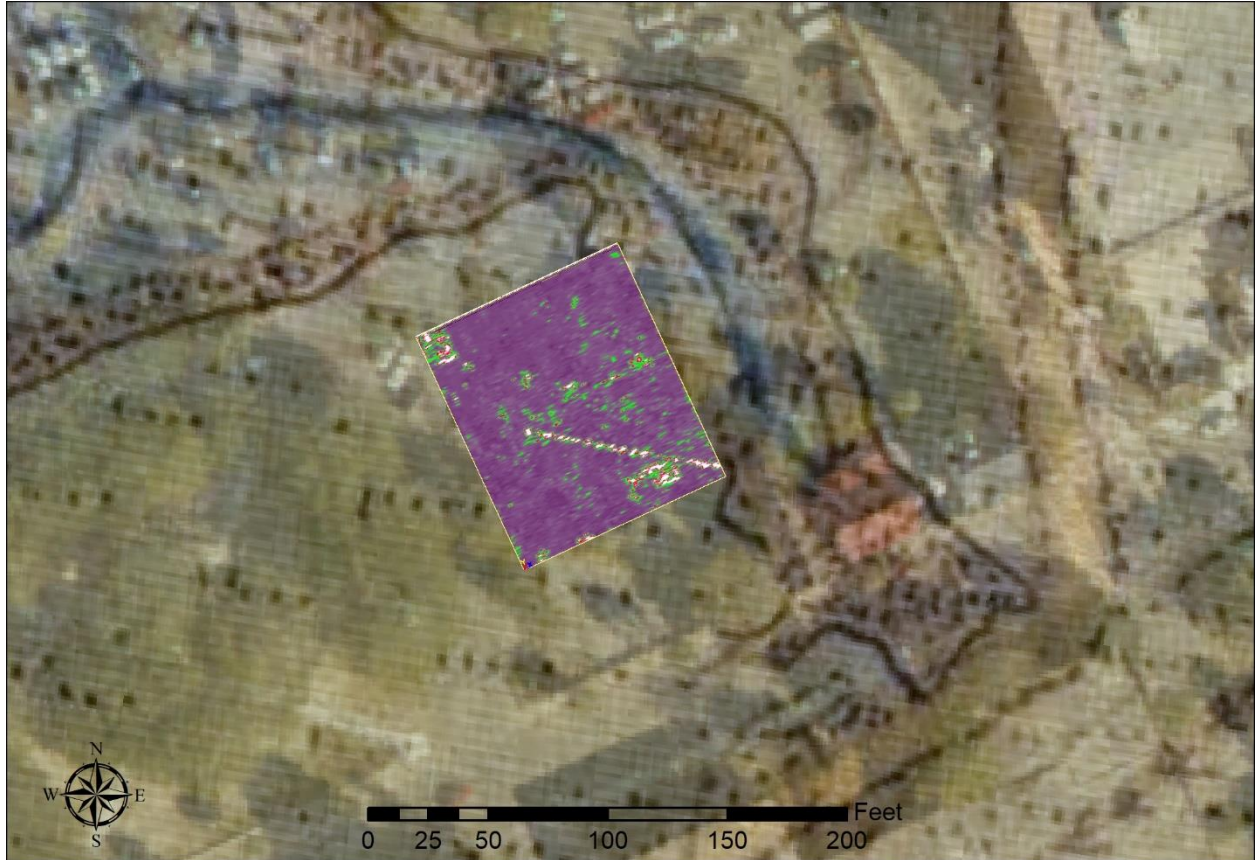
Cigar Factory Parking Lot GPR Survey overlaid with the 1781 Taylor Map and
Modern Aerial Photo



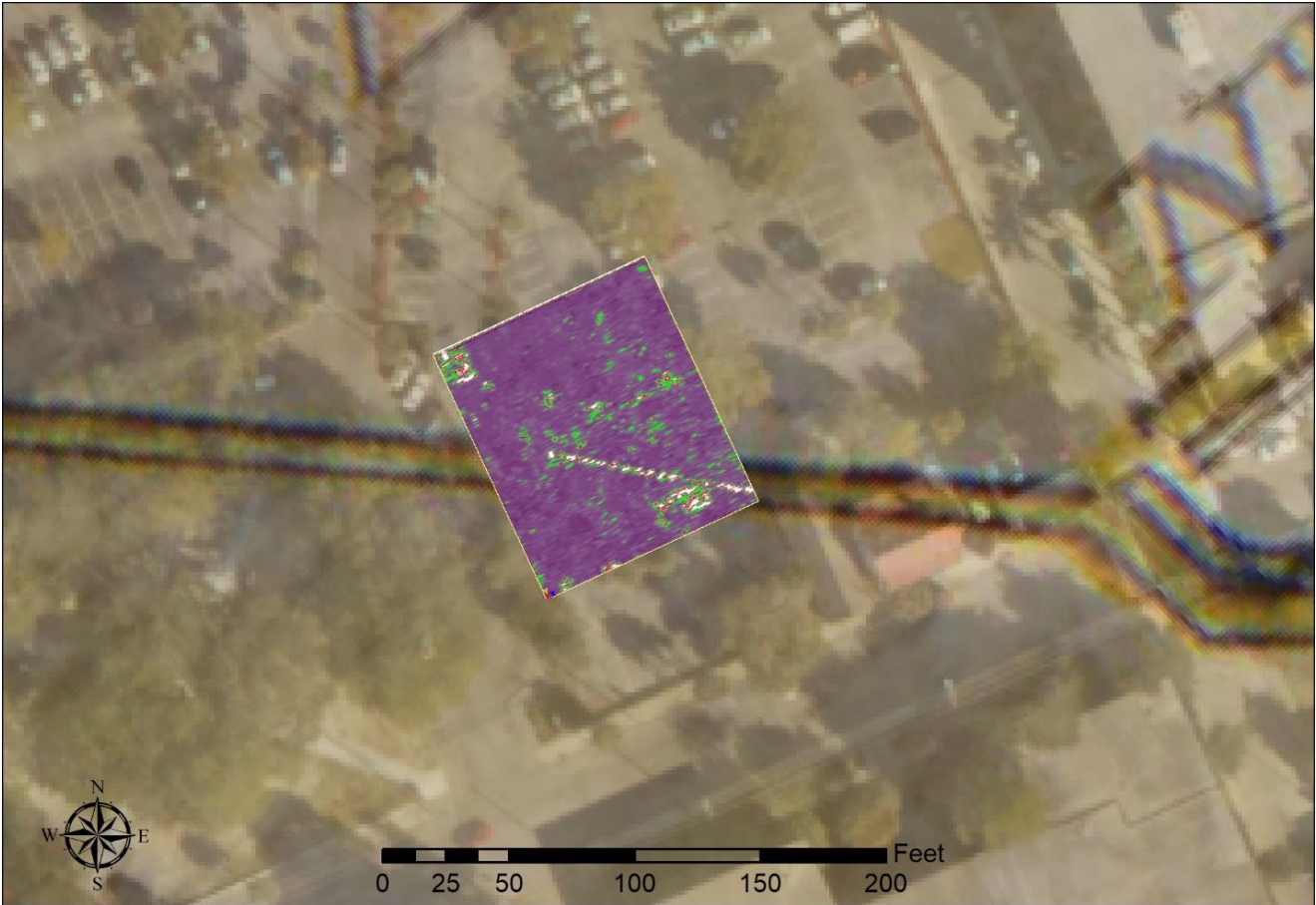
GPR Survey Overlaid with the Blaskowitz Map and Modern Aerial Photo of
The Cigar Factory Parking Lot



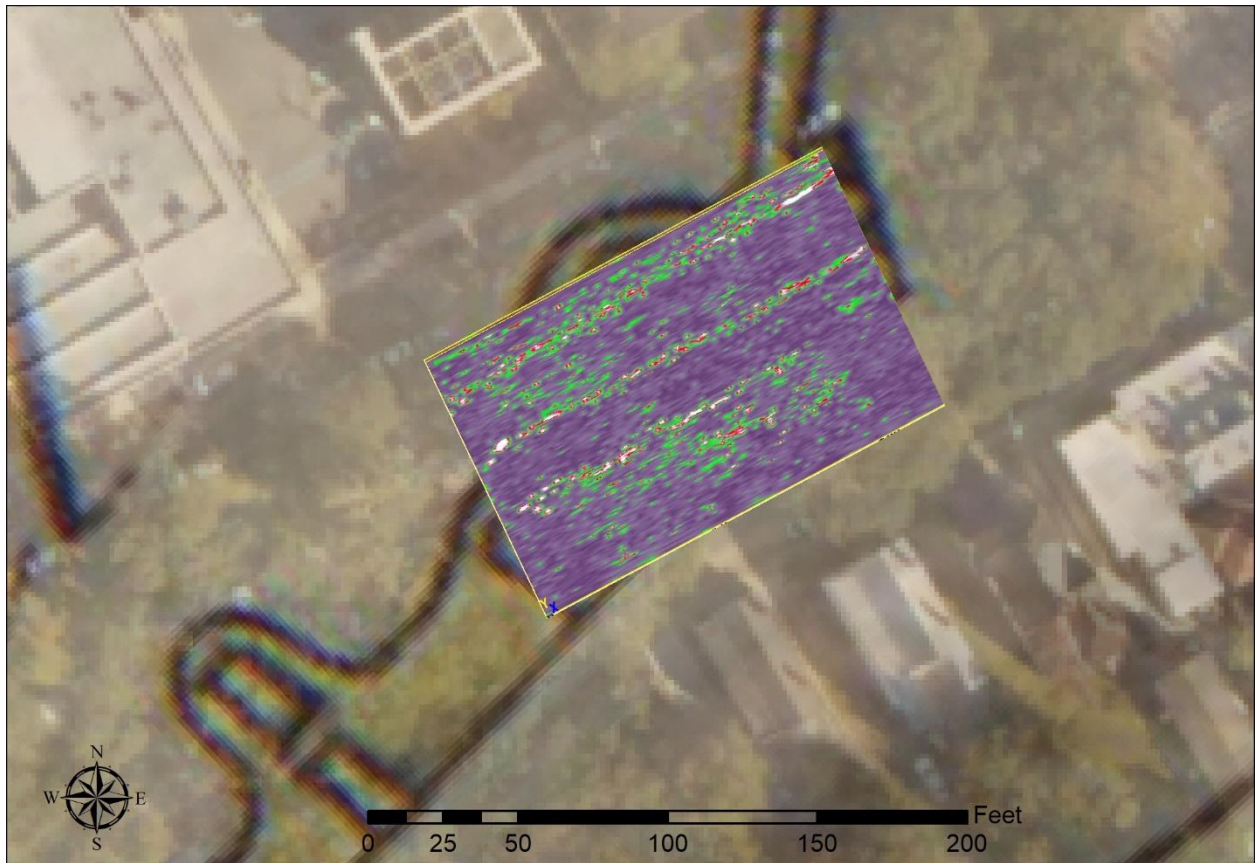
GPR Survey of the Trident Technical College Parking Lot Overlaid with the
Blaskowitz Map and Modern Aerial Photo



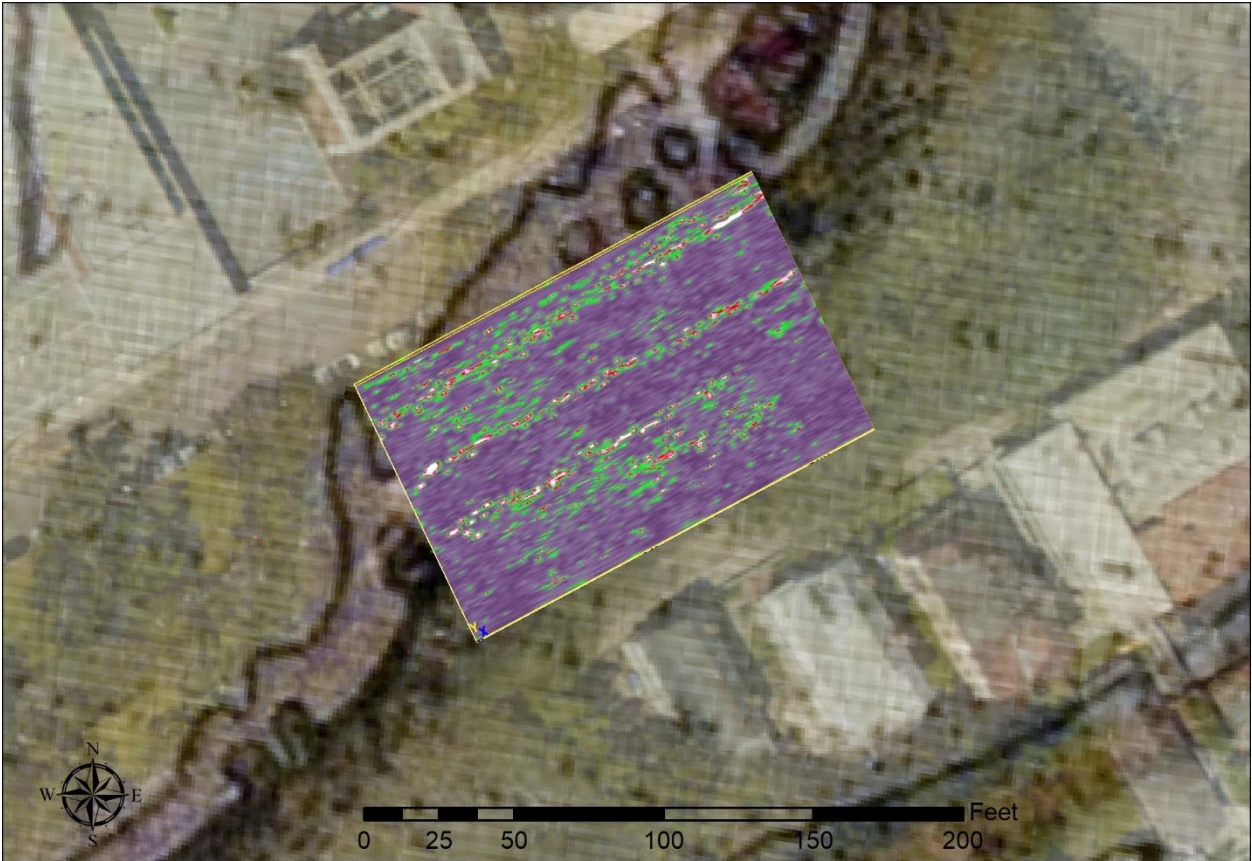
GPR Survey Overlaid with the George Taylor Map and a Modern Aerial Photo



GPR Survey of Wragg Mapp Overlaid with the George Taylor Map and Modern
Aerial Photo

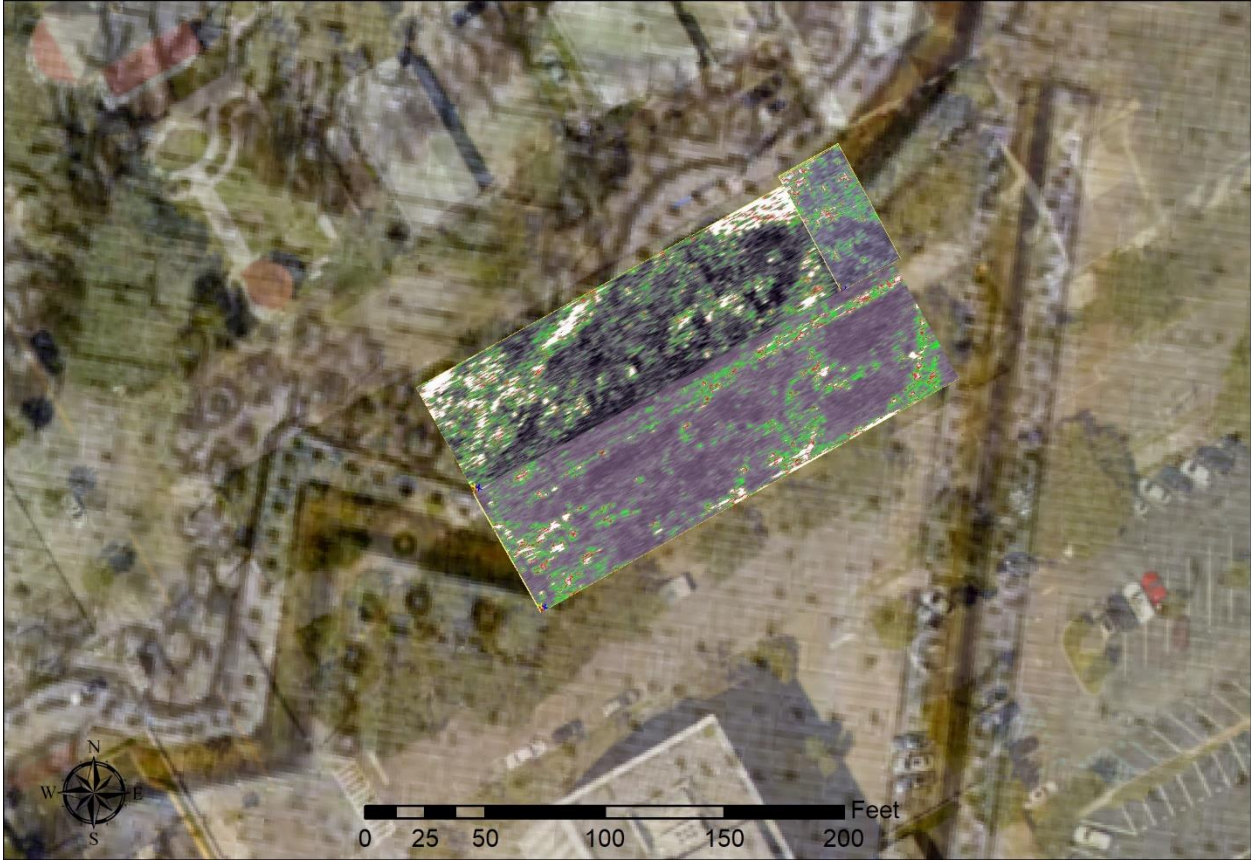


GPR Survey Overlaid with the Blaskowitz Map and Modern Aerial Photo

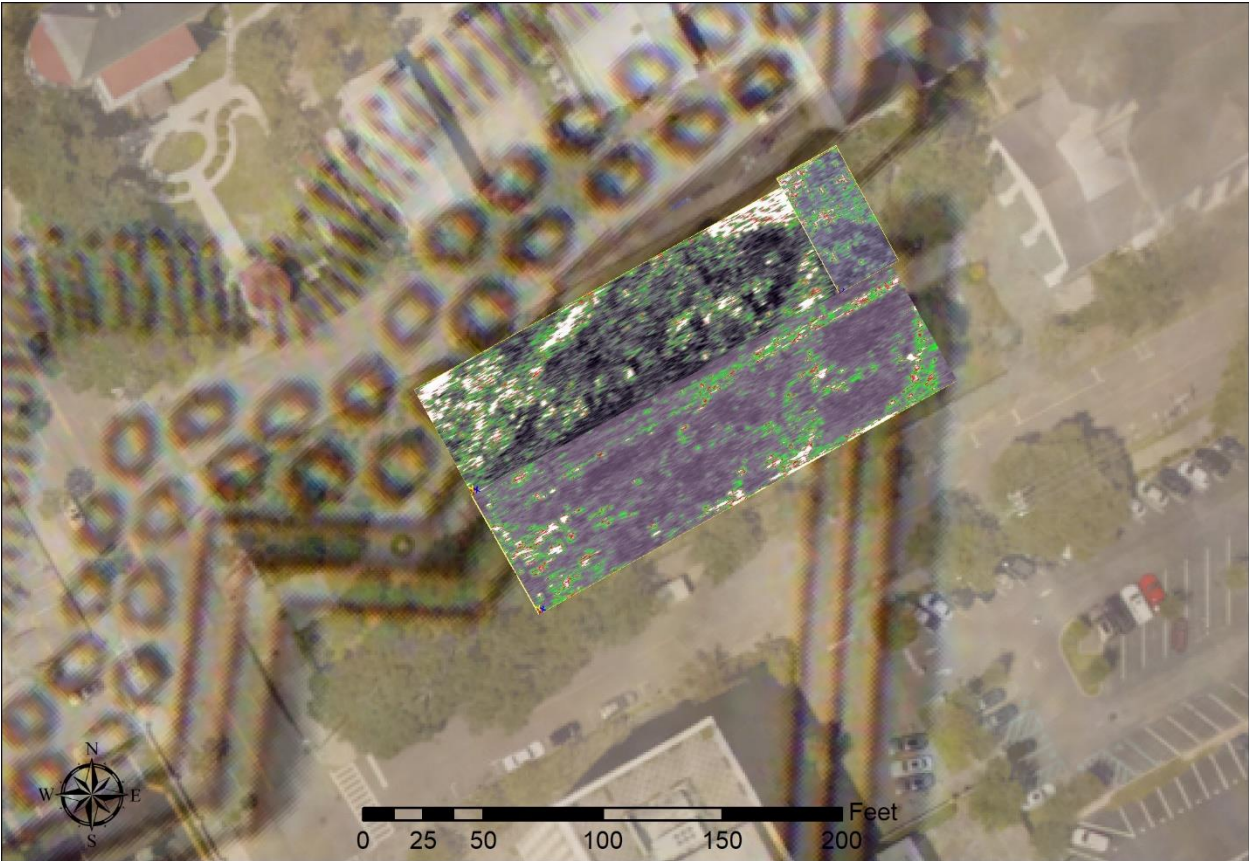


GPR of Wragg Square Overlaid with the Blaskowitz Map and Modern Aerial

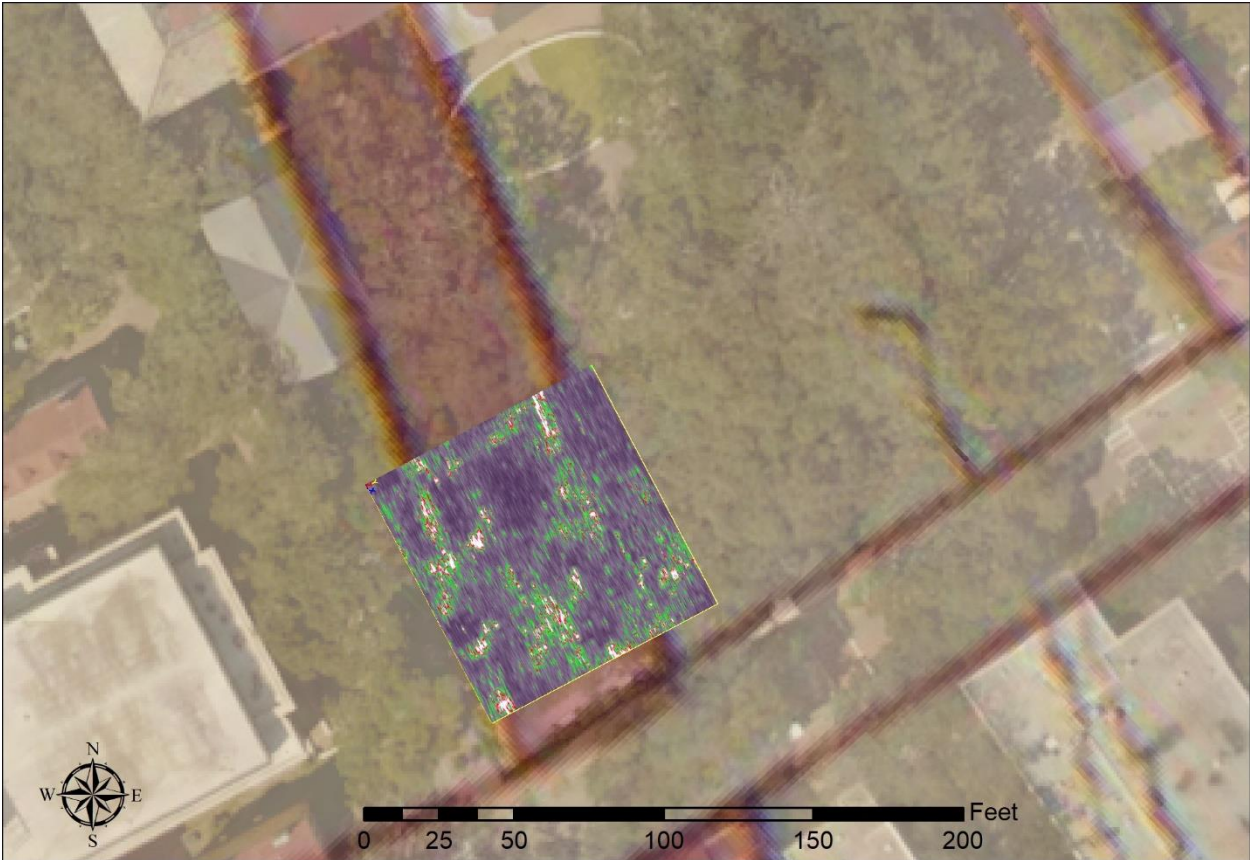
Photo



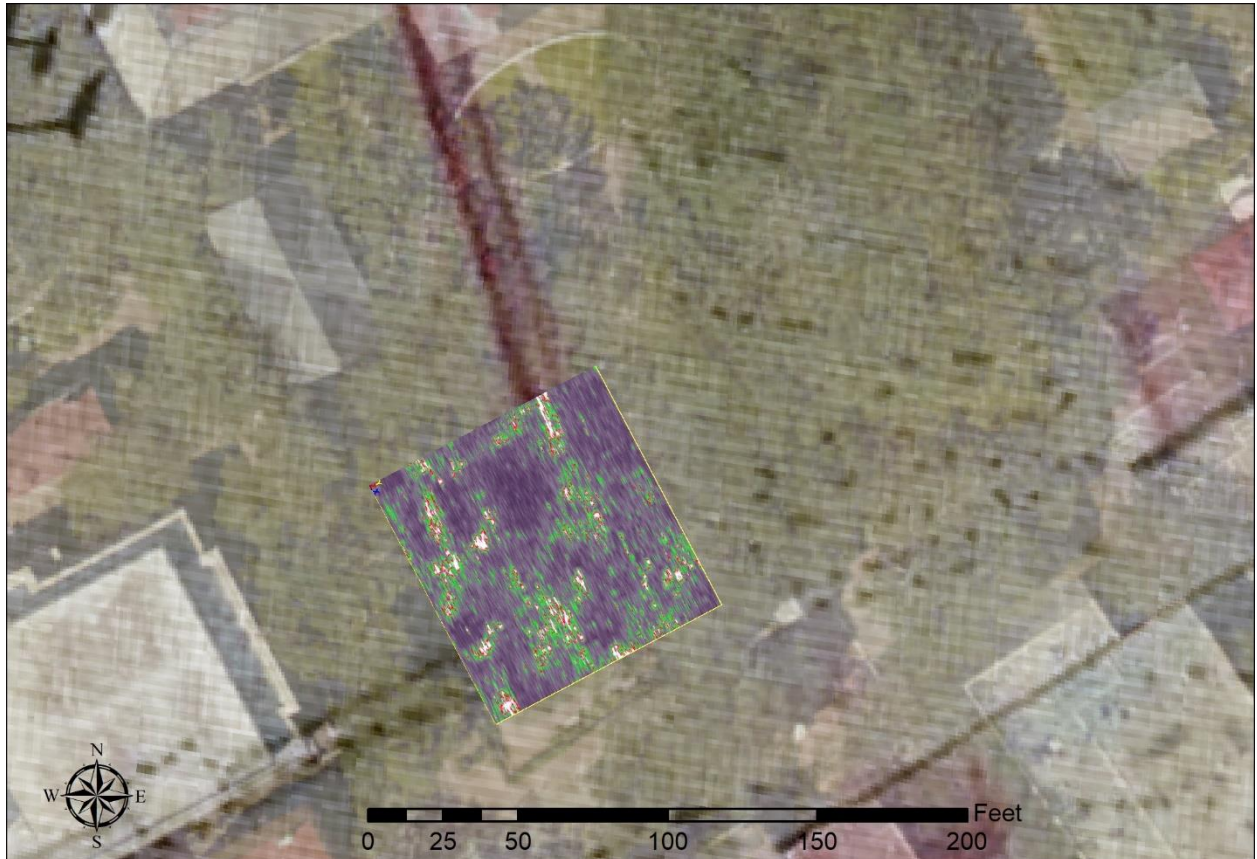
GPR Survey Overlaid with the George Taylor Map and Modern Aerial Photo



GPR Survey Overlaid with the George Taylor Map and Modern Aerial Photo

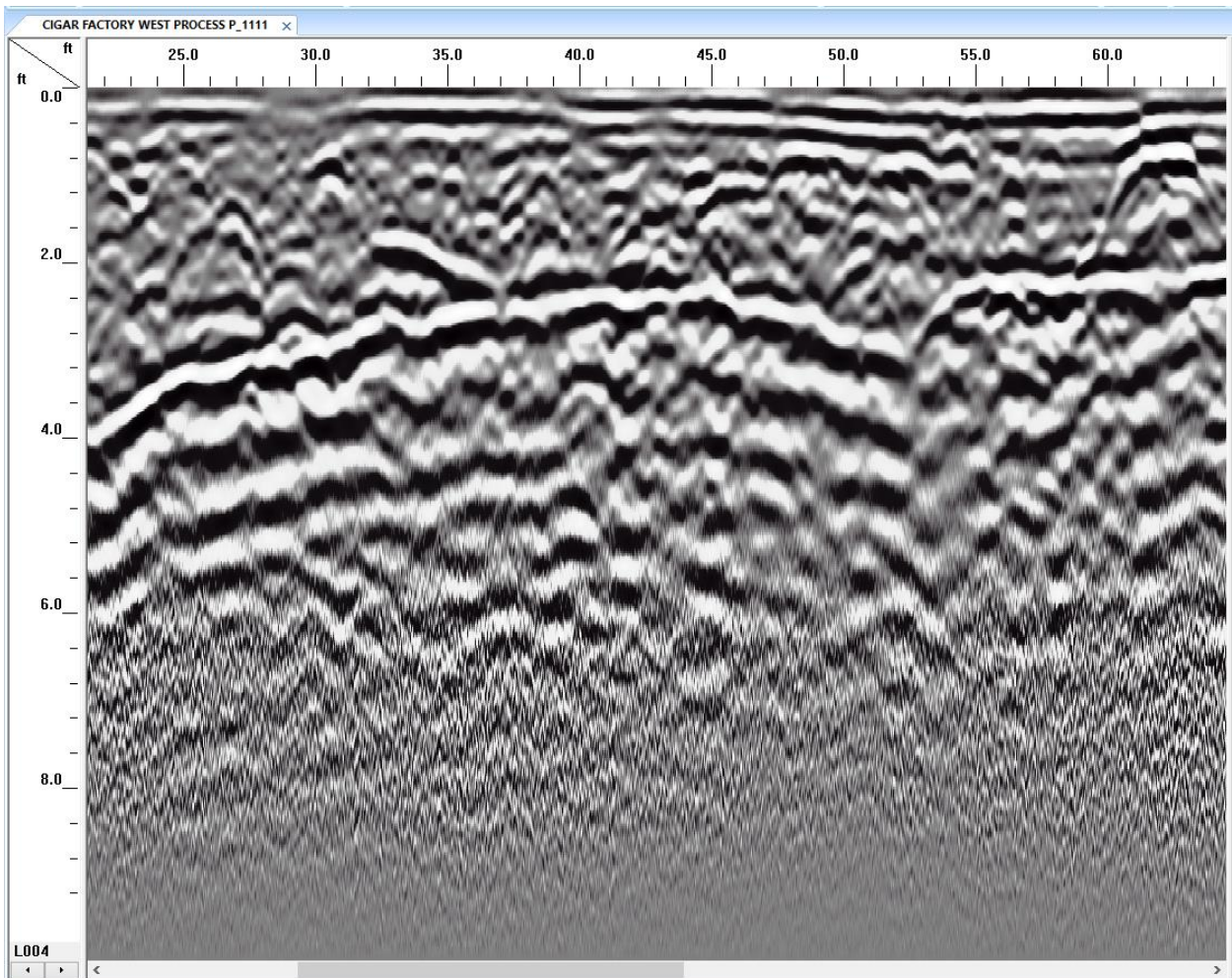


GPR Survey of the Cistern Yard Overlaid with the Blaskowitz Map and Modern
Aerial Photo

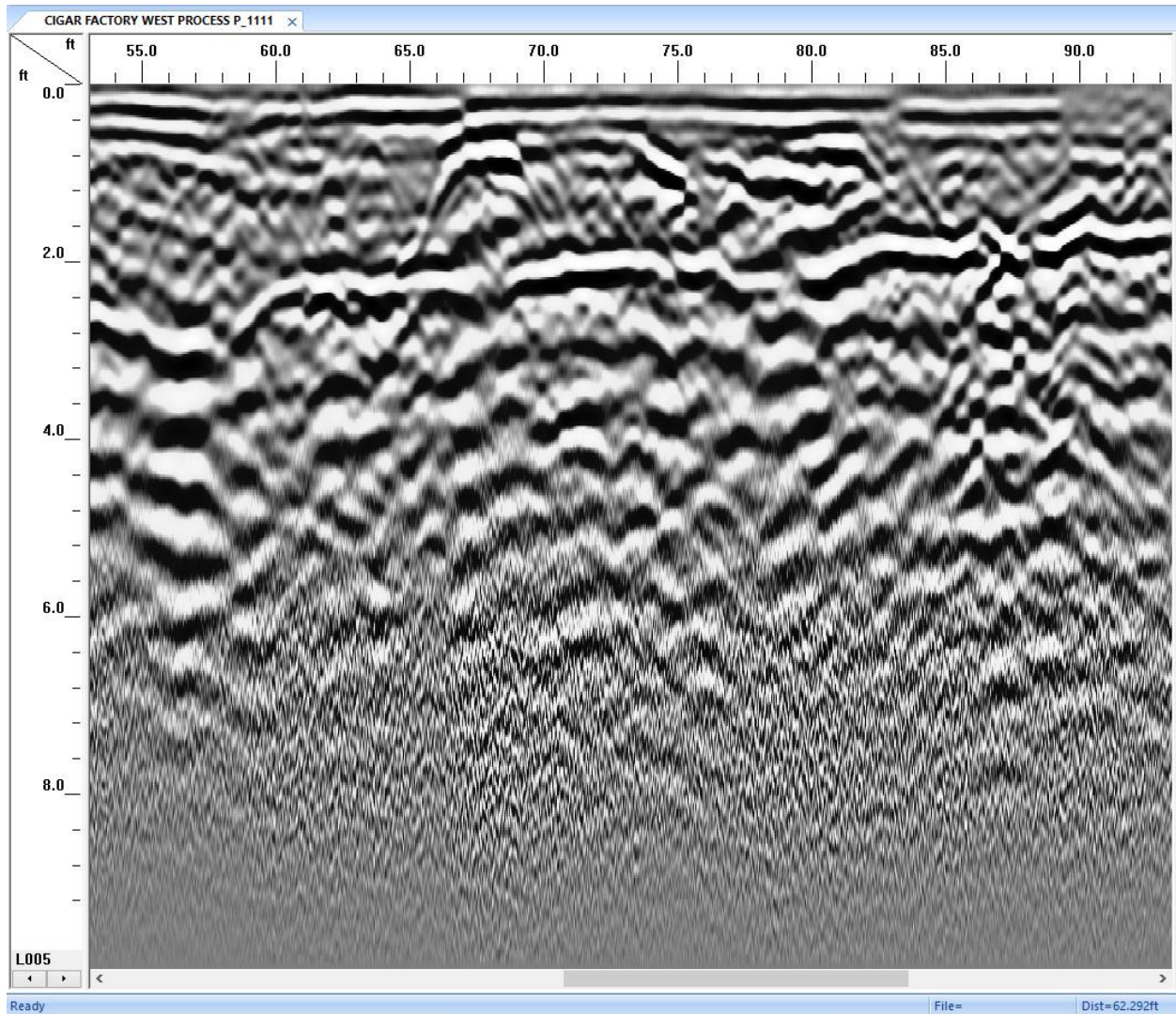


Appendix B: GPR Profiles

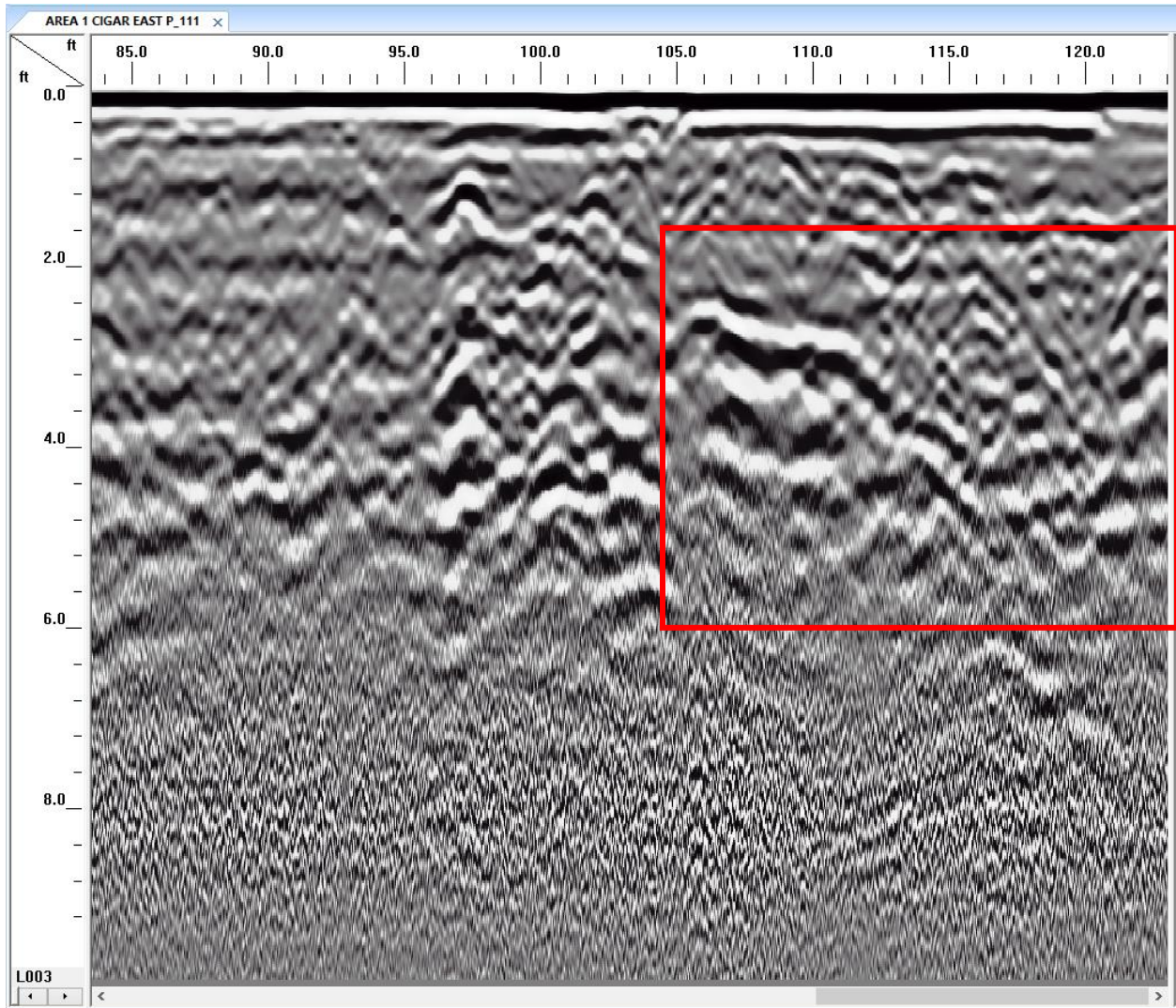
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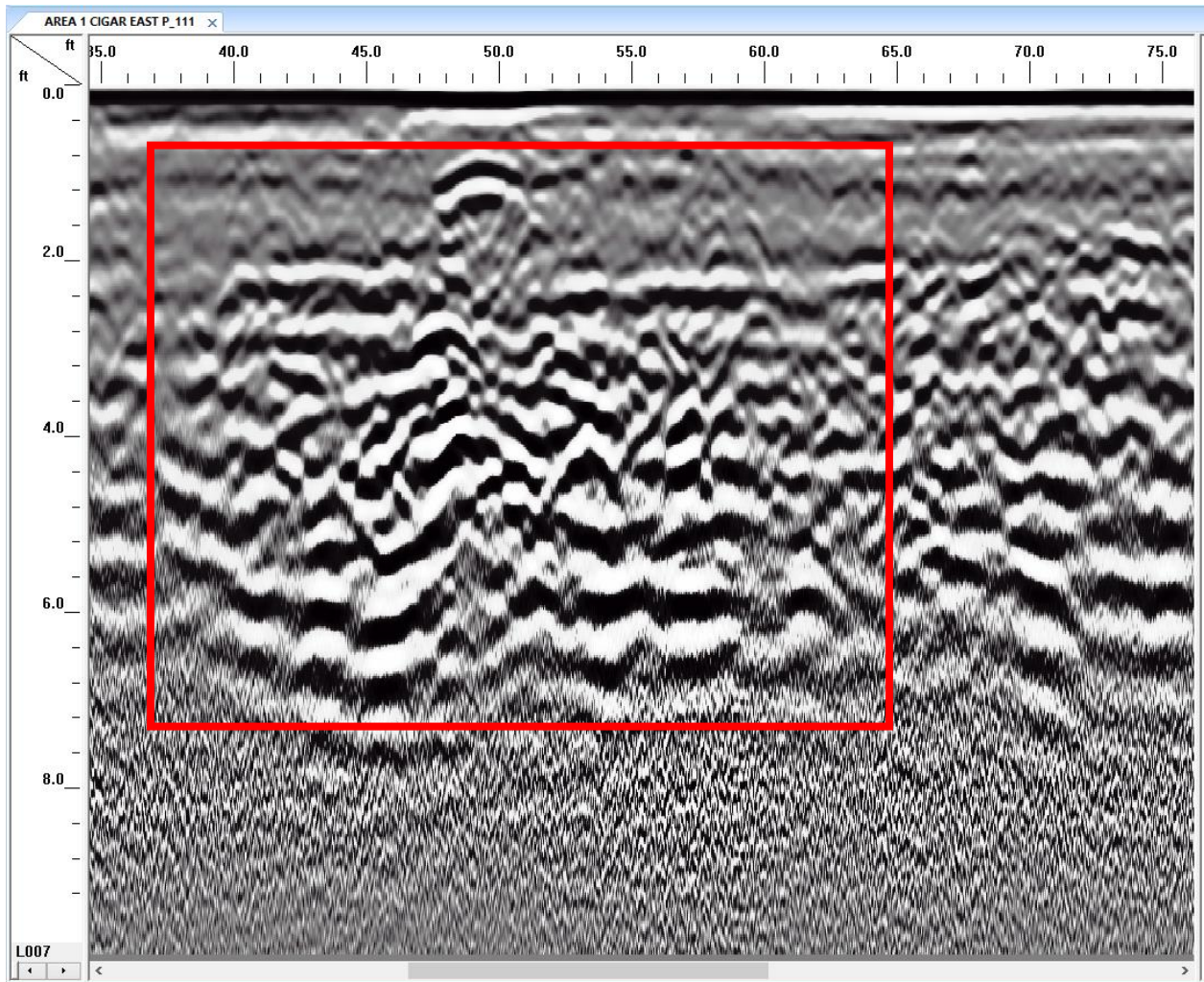
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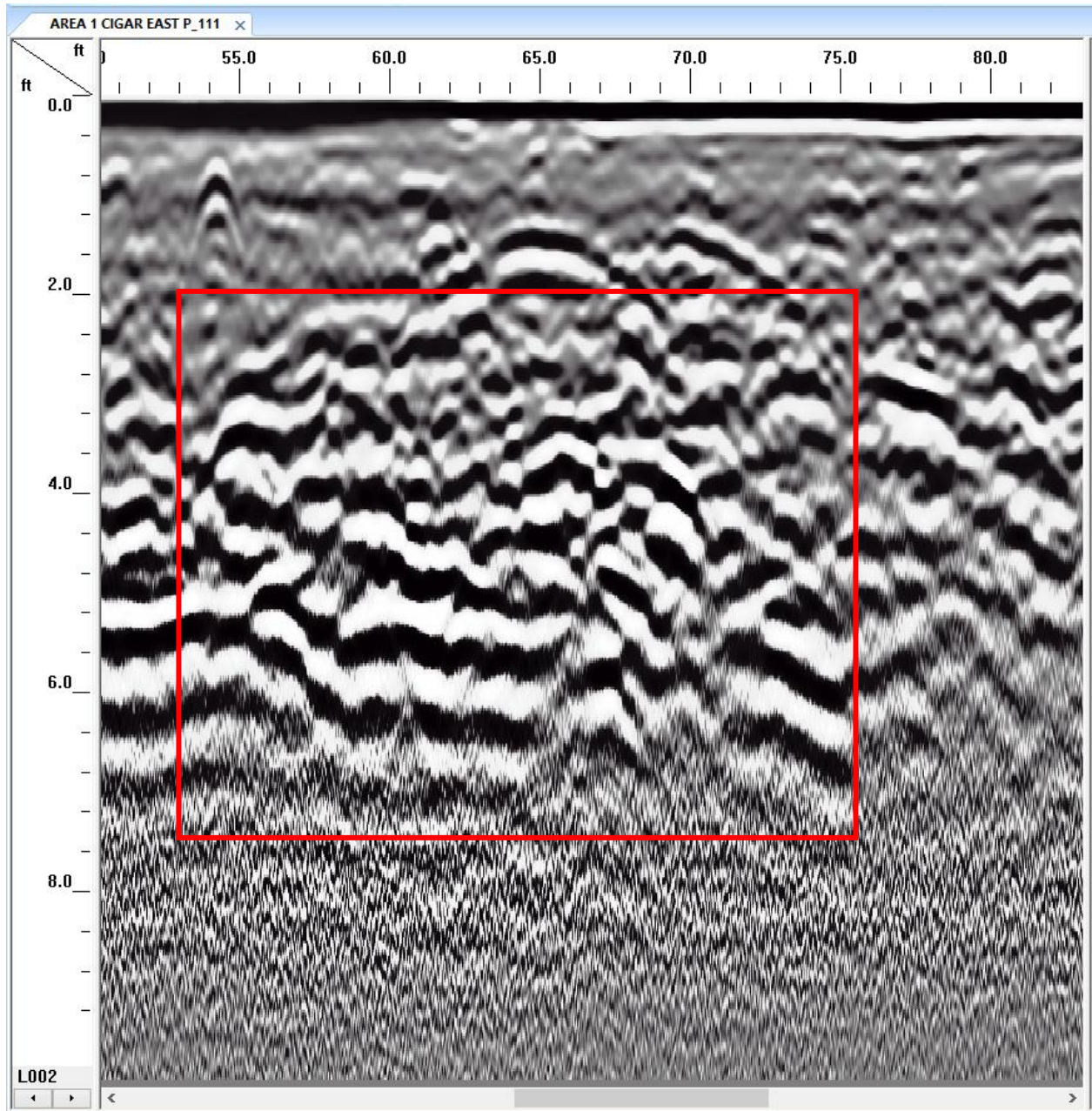
GPR Profile of the Cigar Factory Parking Lot East Side Feature 2



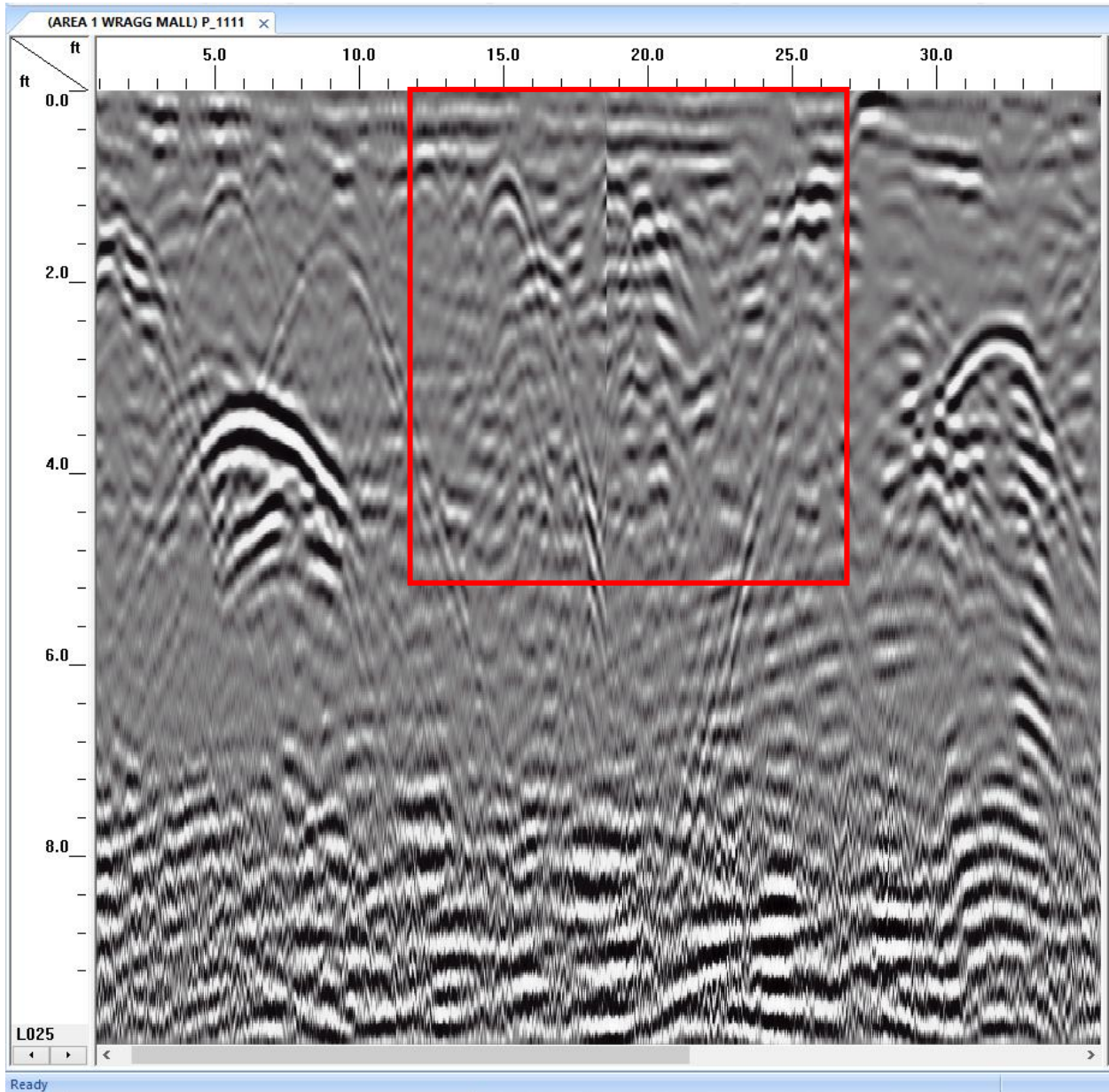
GPR Profile of the Cigar Factory Parking Lot East Side Feature 1



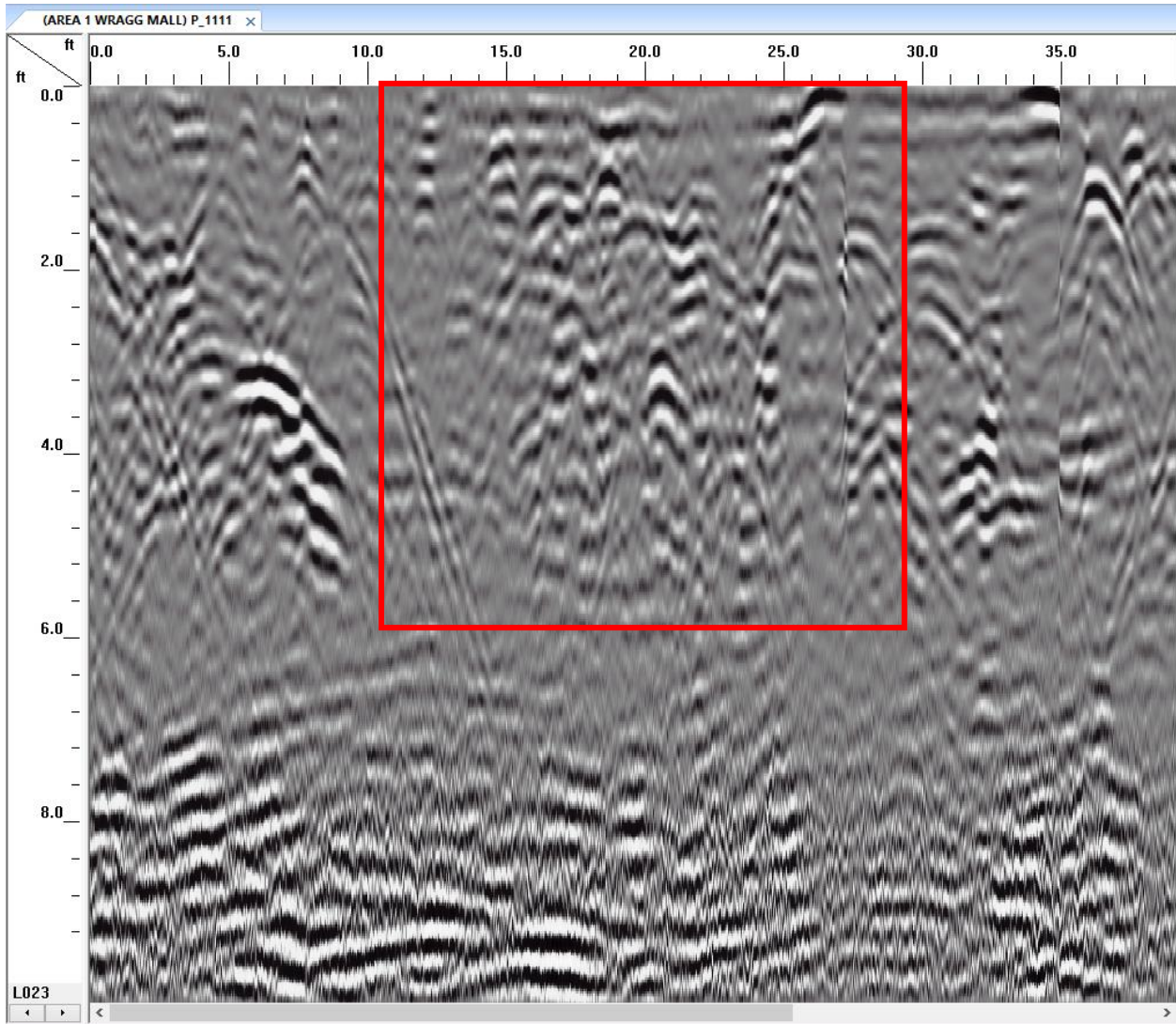
GPR Profile of the Cigar Factory Parking Lot East Side Feature 1



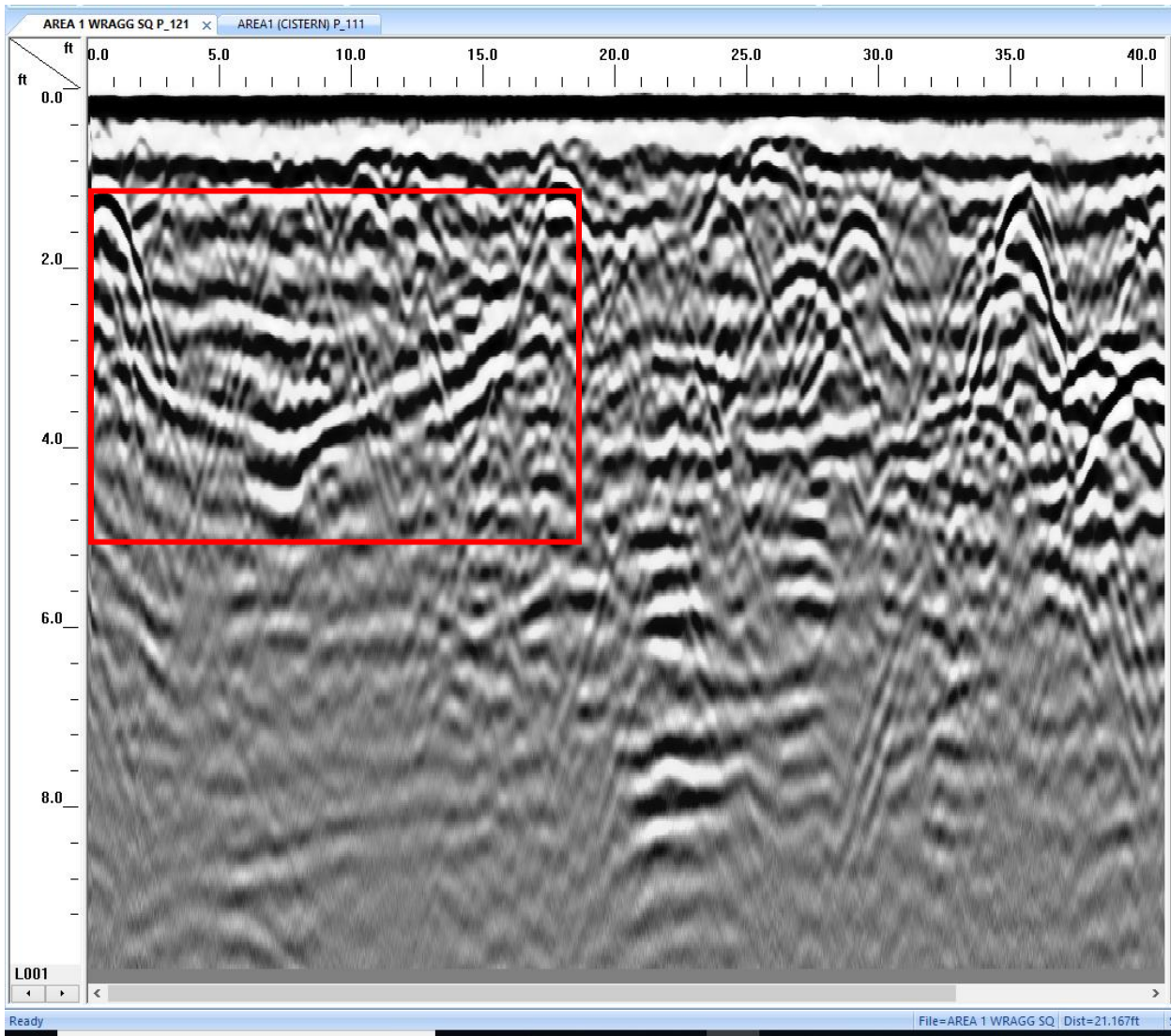
GPR Profile of Wragg Mall Feature 3



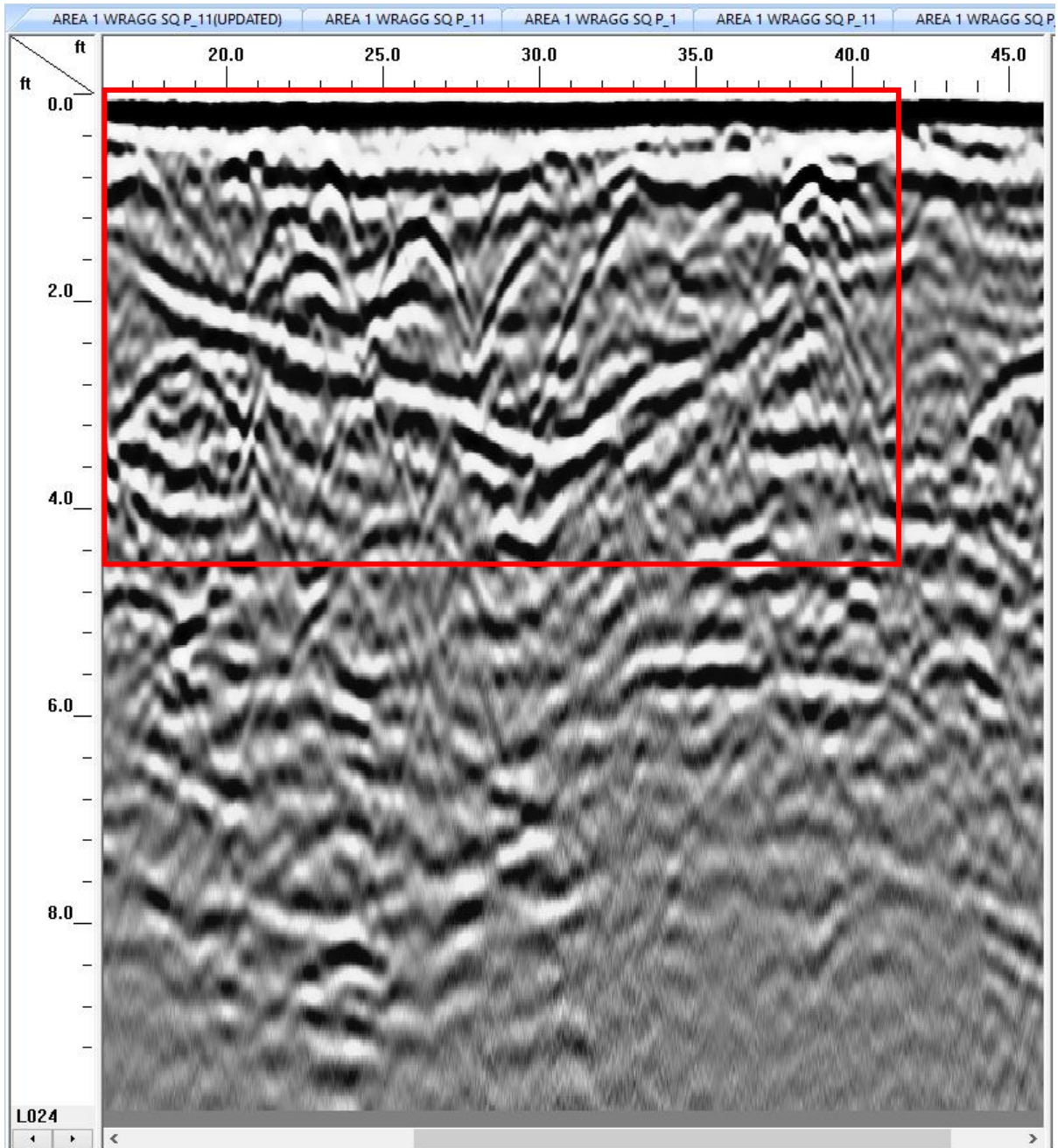
GPR Profile of Wragg Mall Feature 3



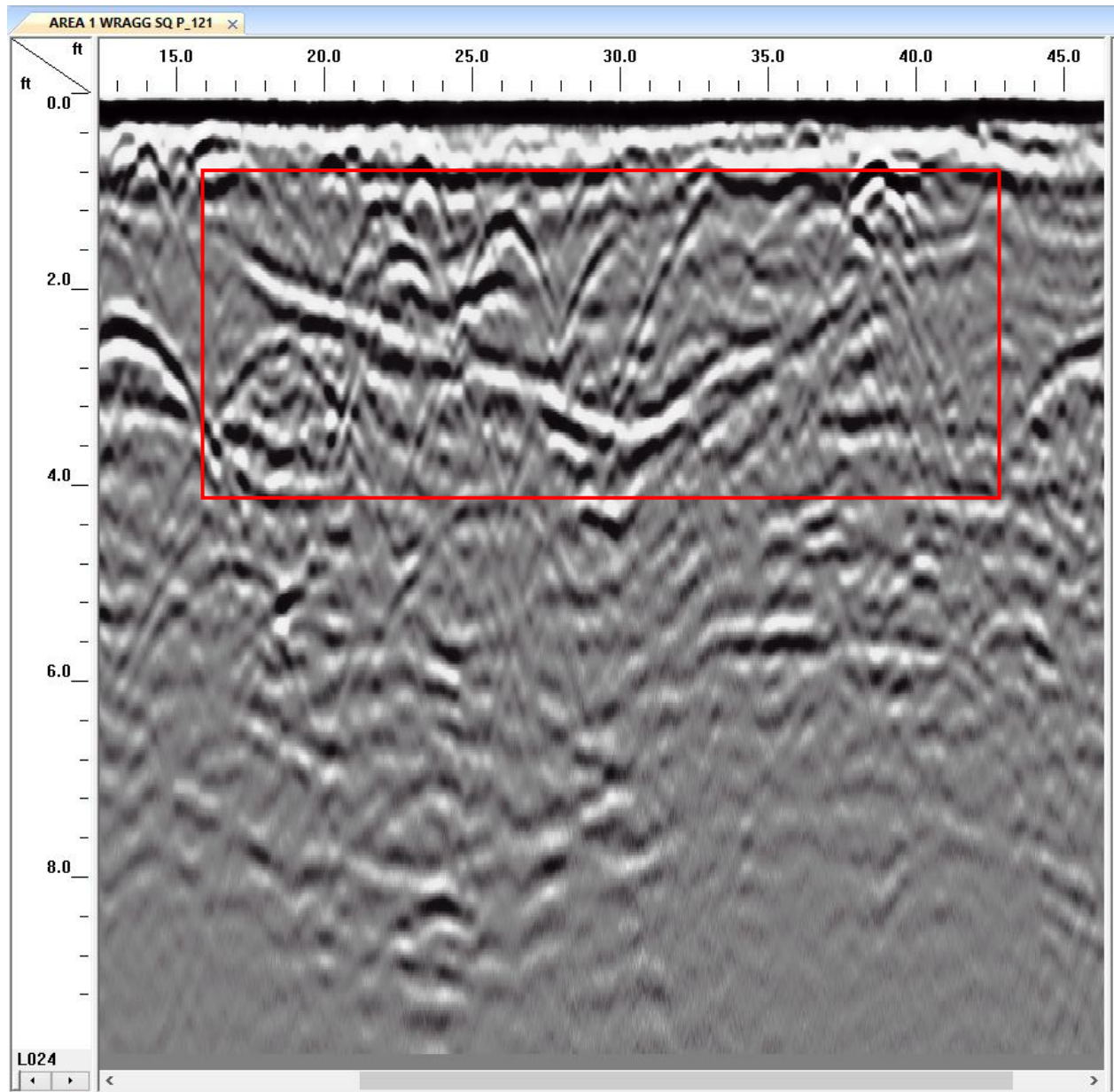
GPR Profile of Wragg Square Feature 1



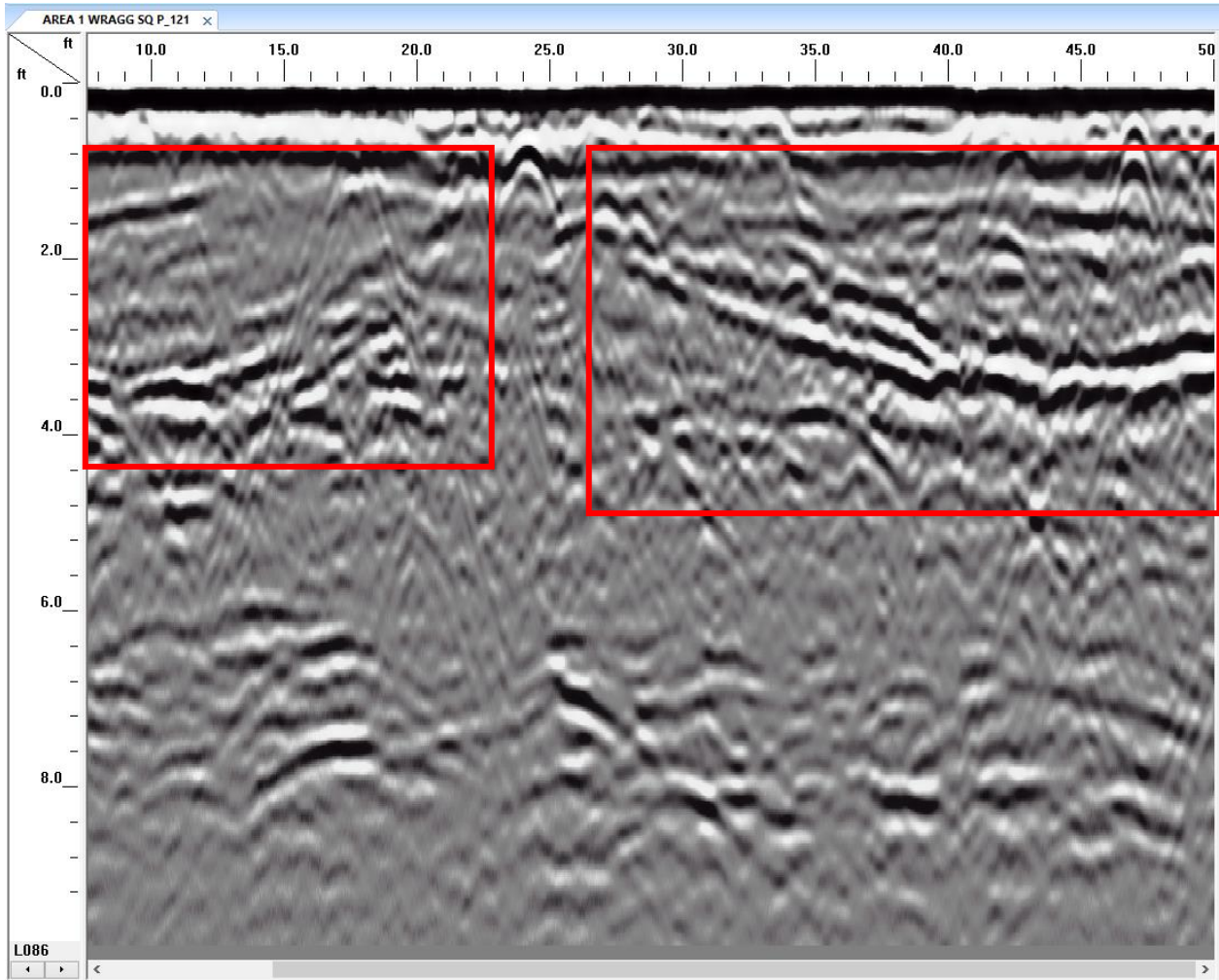
GPR Profile of Wragg Square Feature 1



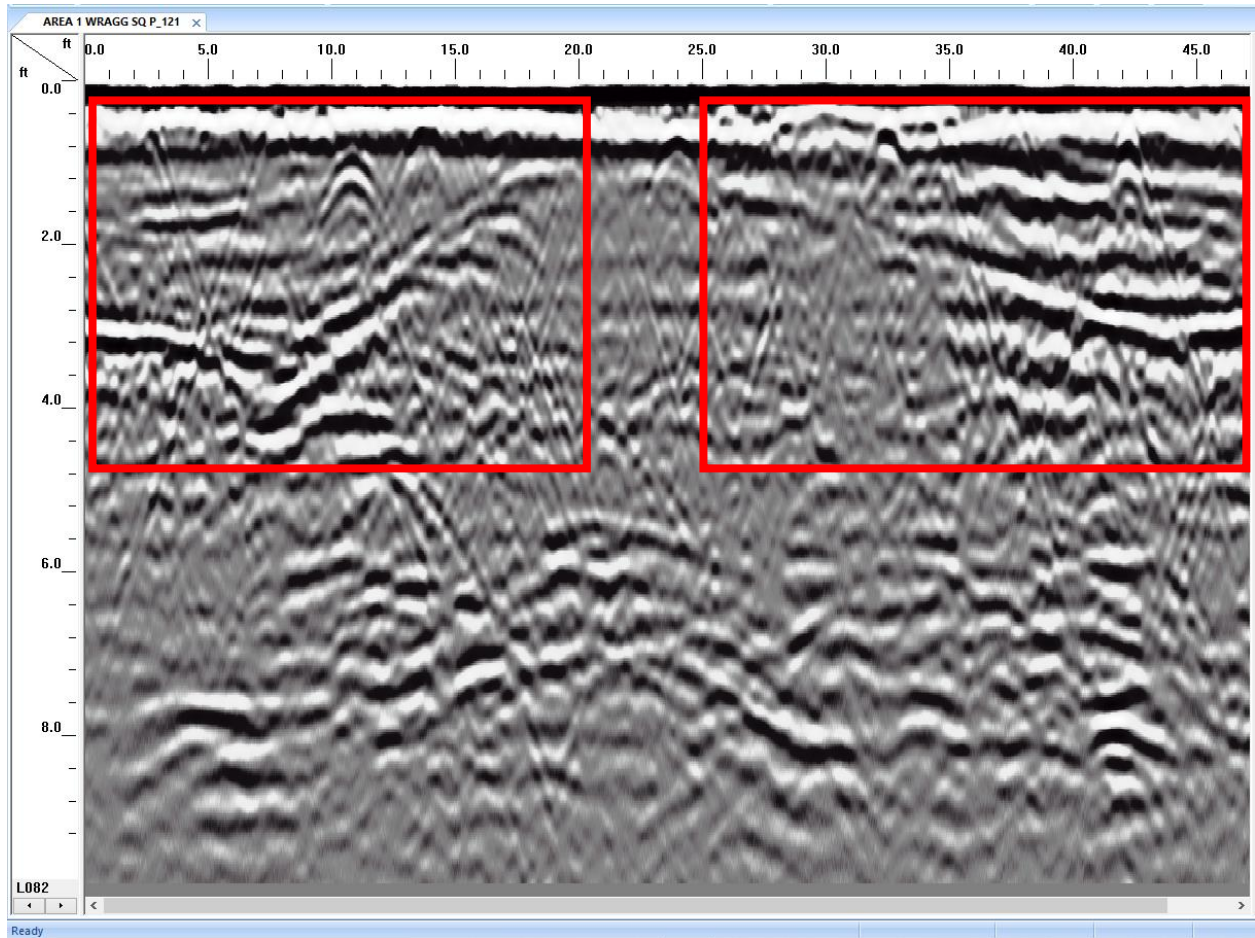
GPR Profile of Wragg Square Feature 1



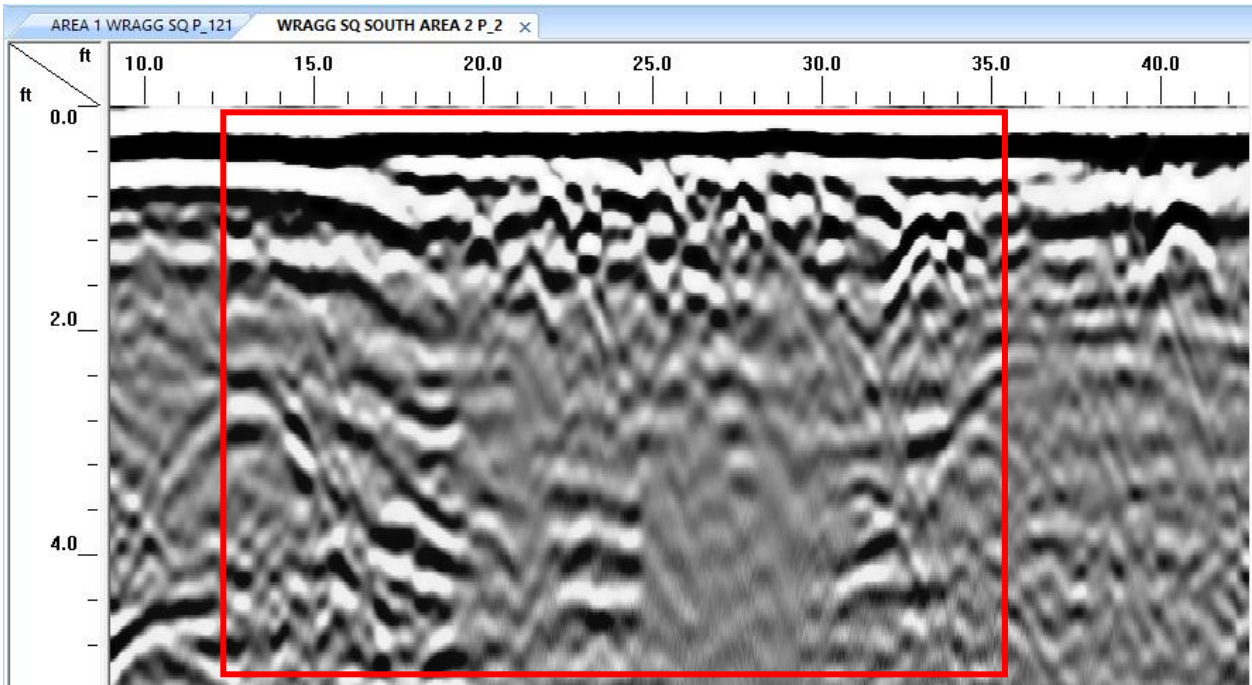
GPR Profile of Wragg Square Feature 2 and 3



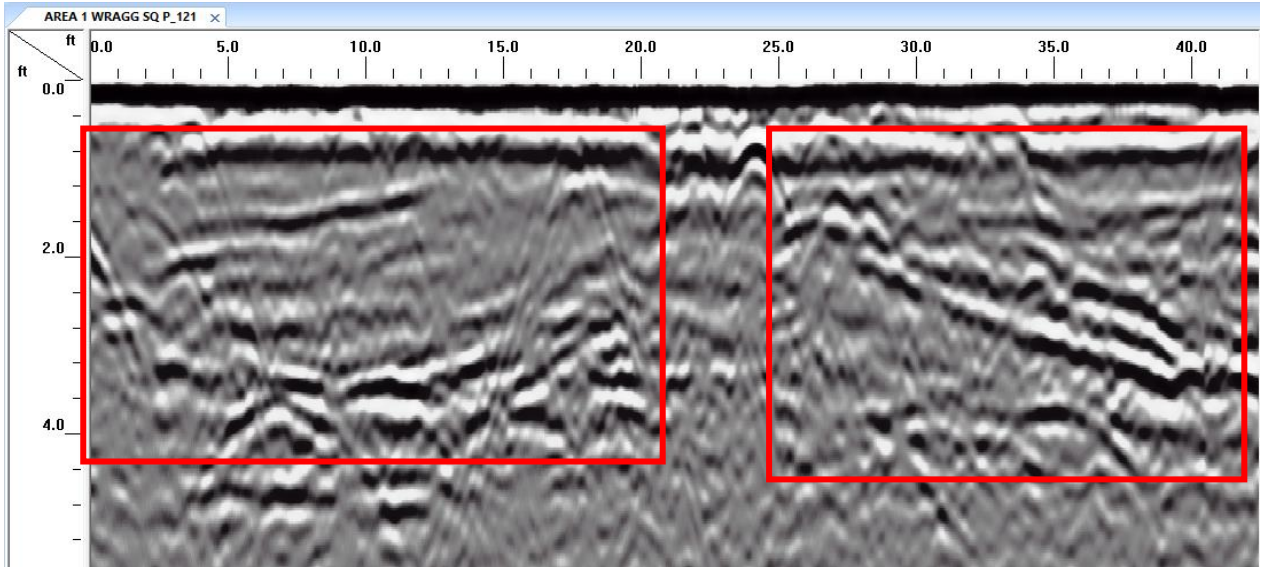
GPR Profile of Wragg Square Features 2 and 3



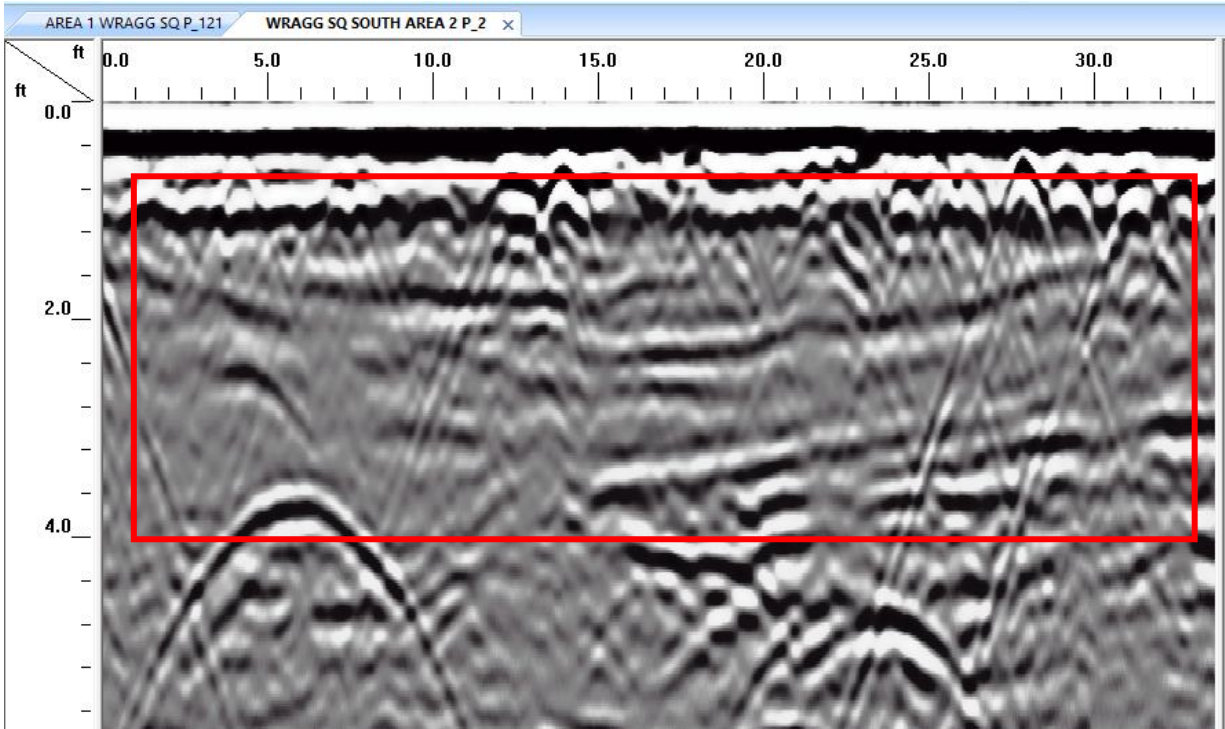
GPR Profile of Wragg Square Feature 3



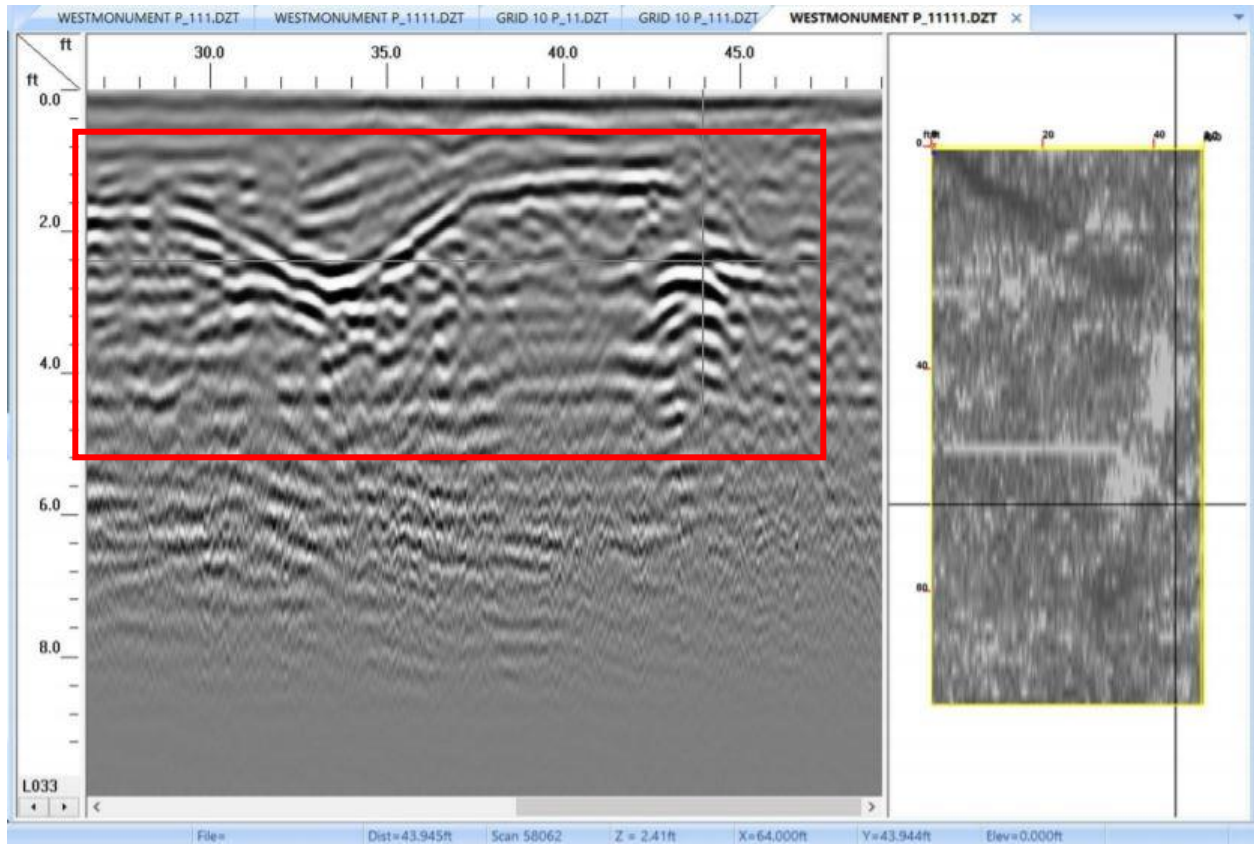
GPR Profiles of Wragg Square Feature 2 and 3



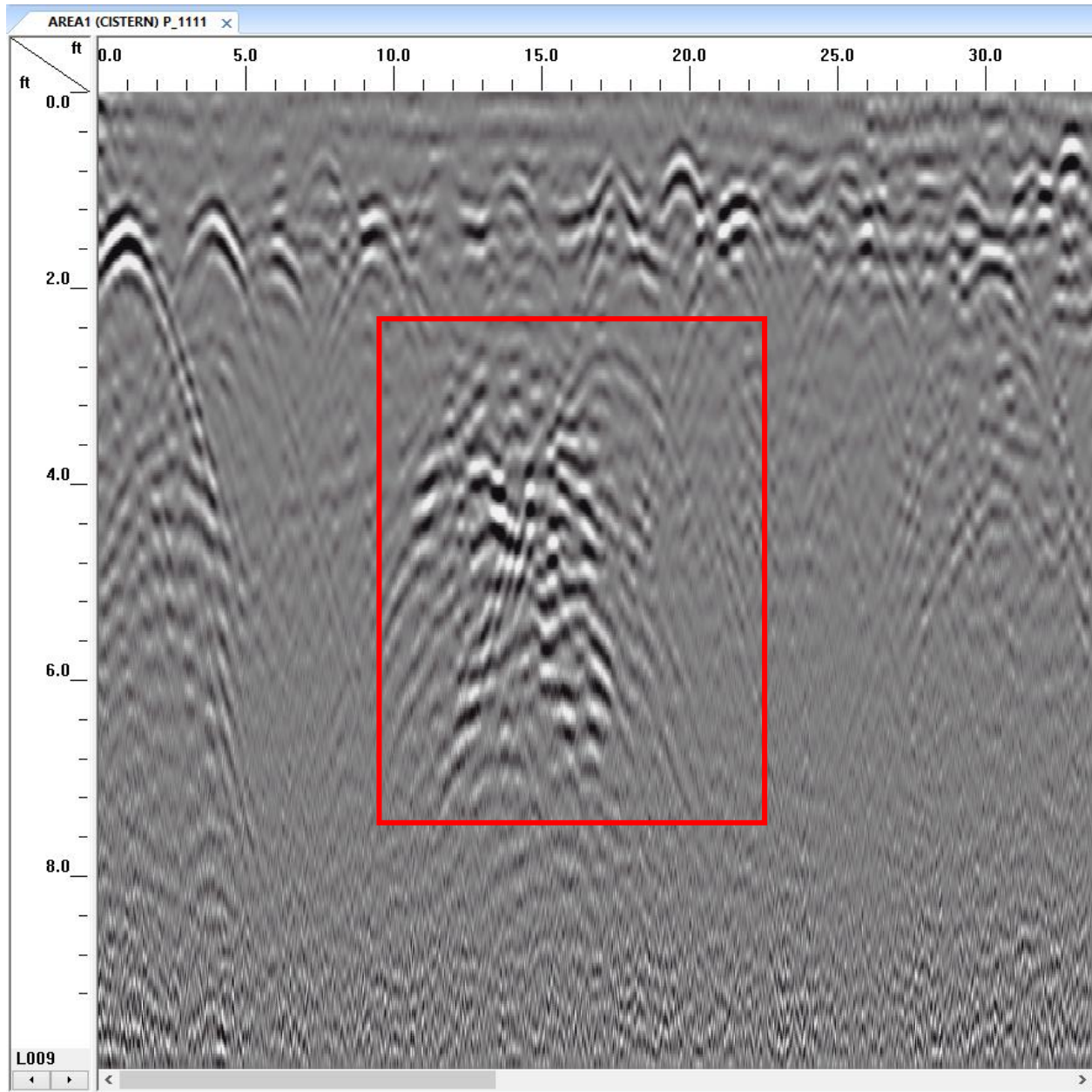
GPR Profile Wragg Square Feature 4



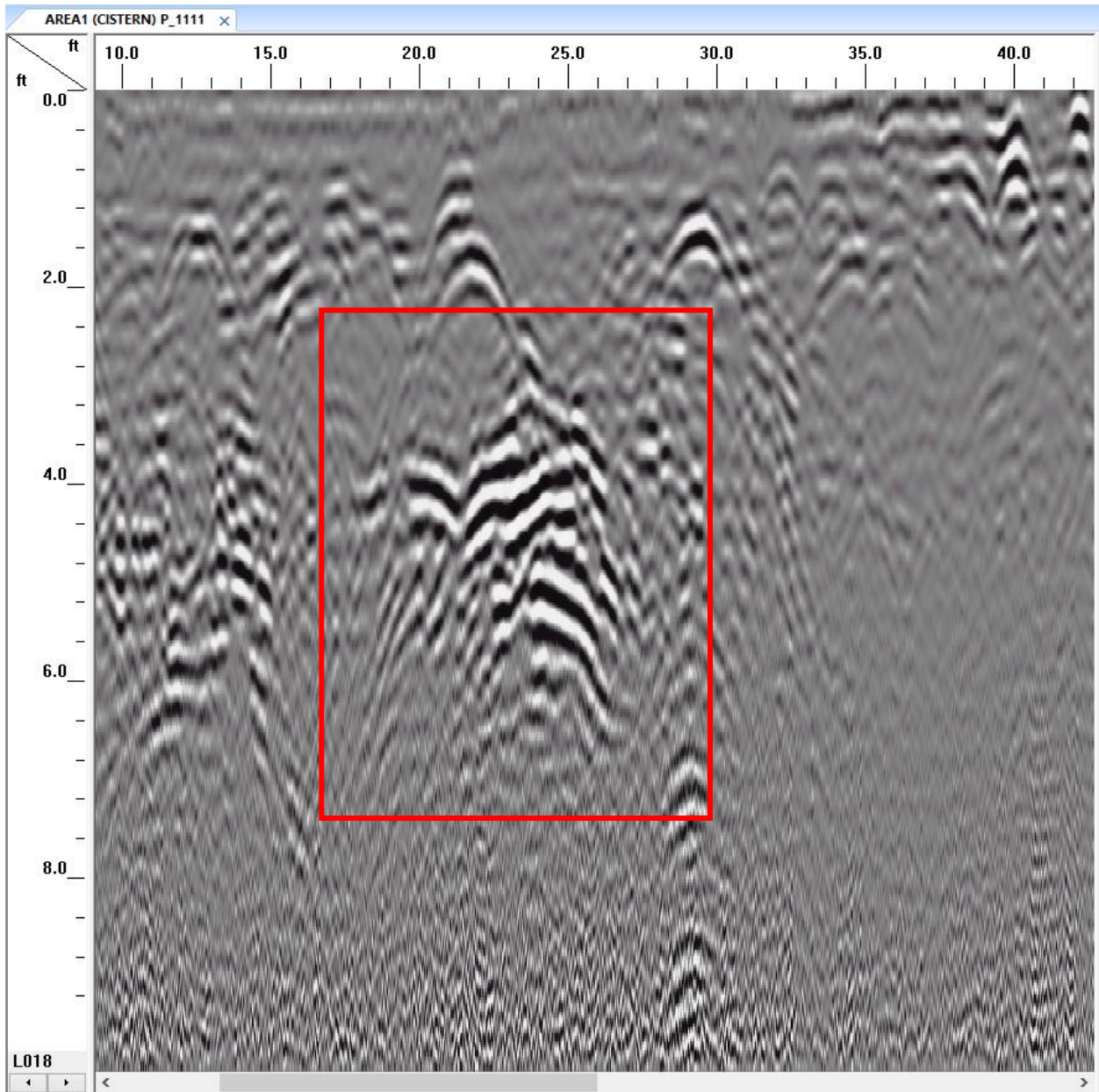
GPR Profile of Marion Square



GPR Profile of the Cistern Yard



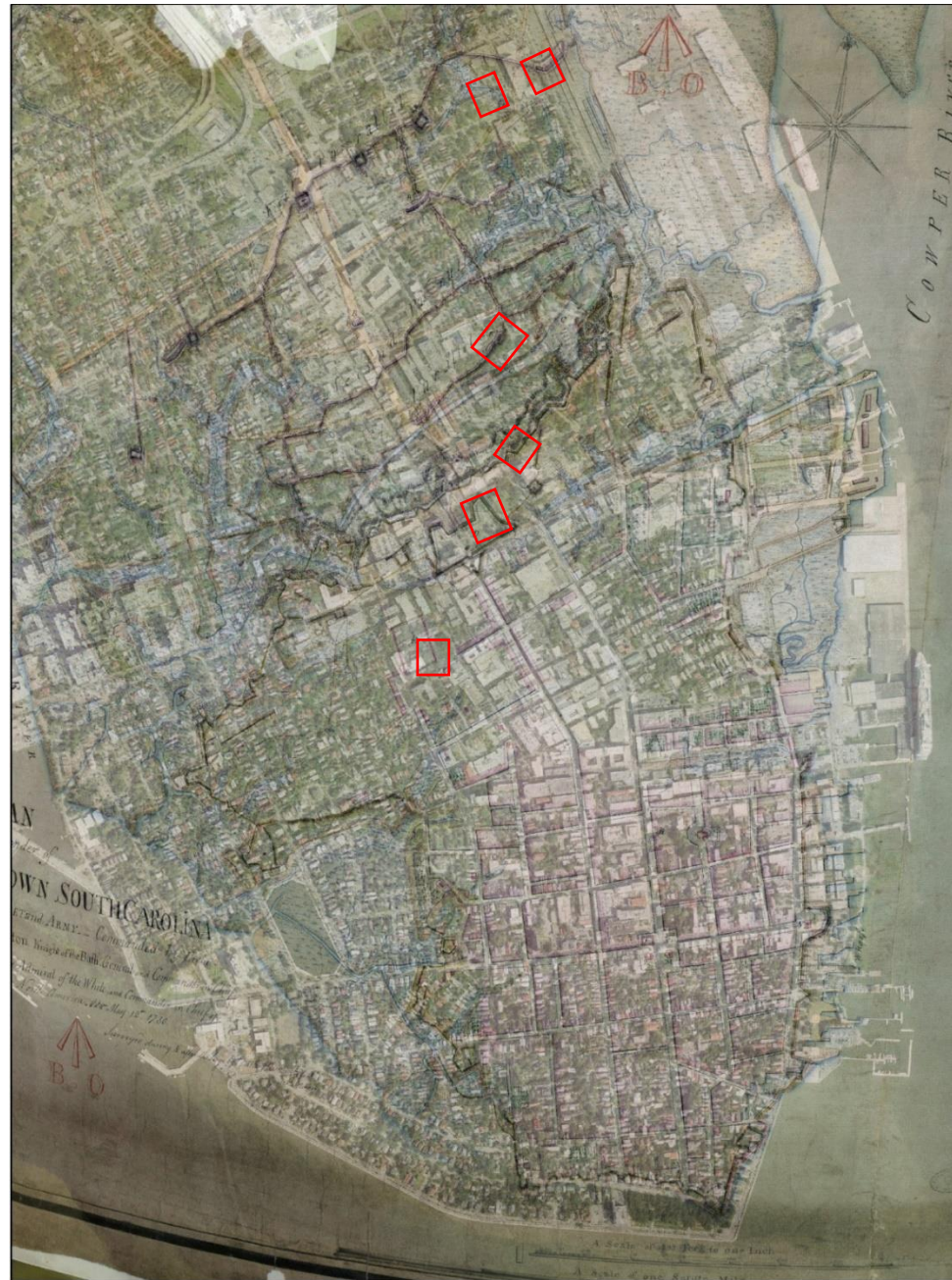
GPR Profile of the Cistern Yard Feature 1



Appendix C: Historic Map Overlays

The Charles Blaskowitz Map 1780 Georeferenced with a Modern Aerial

Photograph. Survey Areas in Red Boxes.



0 500 1,000 2,000 3,000 4,000 Feet

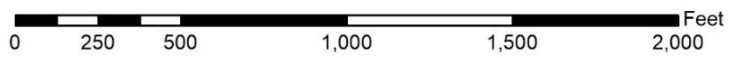
The Geoge Taylor Map 1781 Georeferenced with the Modern Landscape. Survey

Areas in Red Boxes.



0 500 1,000 2,000 3,000 4,000 Feet

A Plan of Wraggsborough a Plat by Joseph Purcell 1801 Georeferenced with a Modern Photograph.



A Plan of College Lands 1801 by Joseph Purcell Georeferenced with a Modern

Photograph

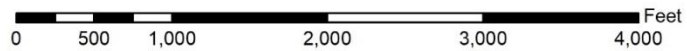


0 75 150 300 450 600 Feet

Appendix D: Maps for Further Study

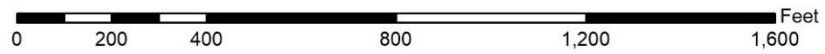
A Plan of Charleston Neck by Joseph Purcell 1807 Georeferenced with a Modern

Aerial Photograph

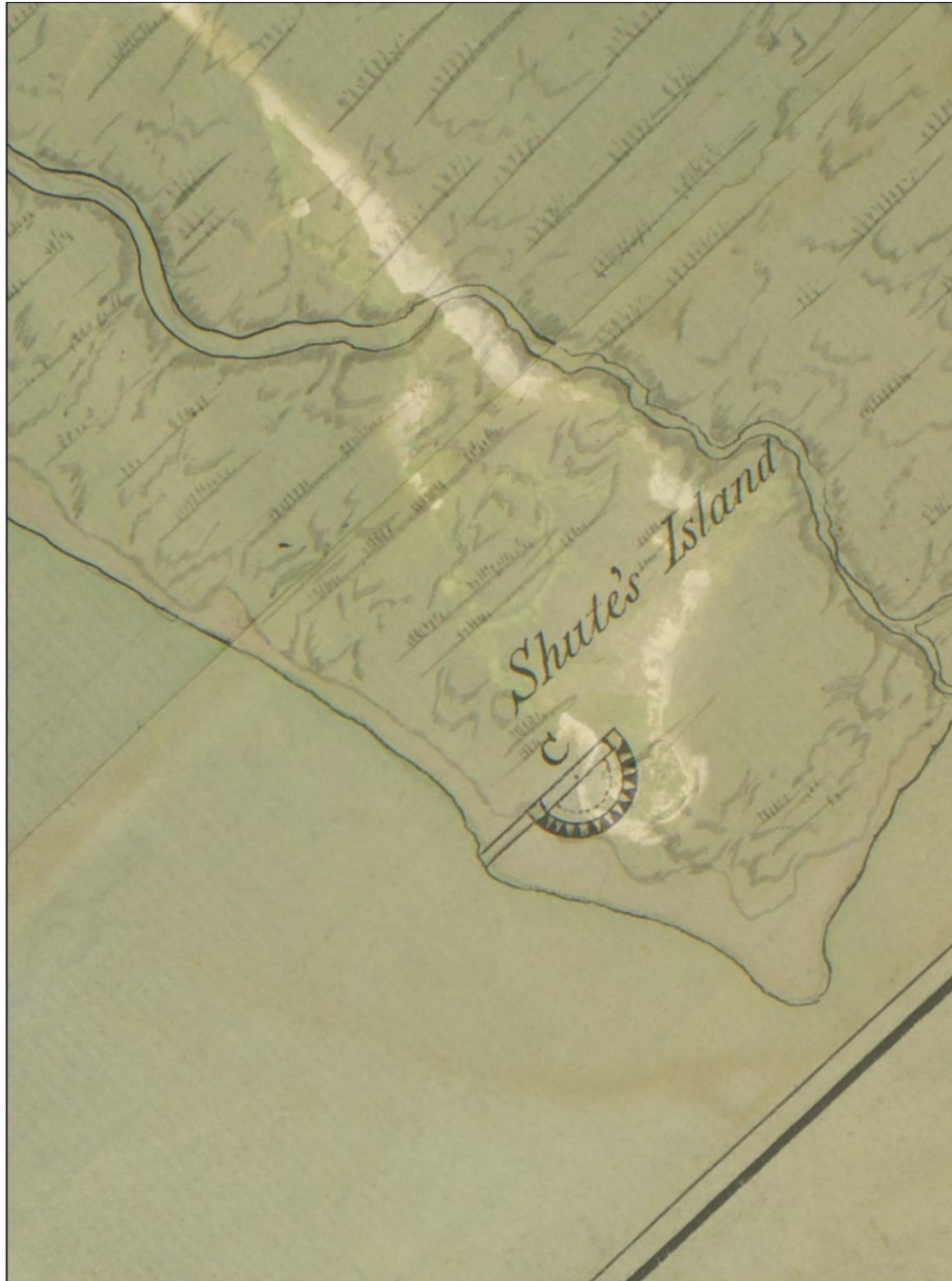


McCrary Plat 490 from 1798 by John Goddard. Georeferenced with a Modern

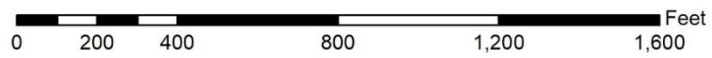
Aerial Photograph



George Taylor Map 1781, Shutes Folly Island Georeferenced with a Modern
Aerial Photograph



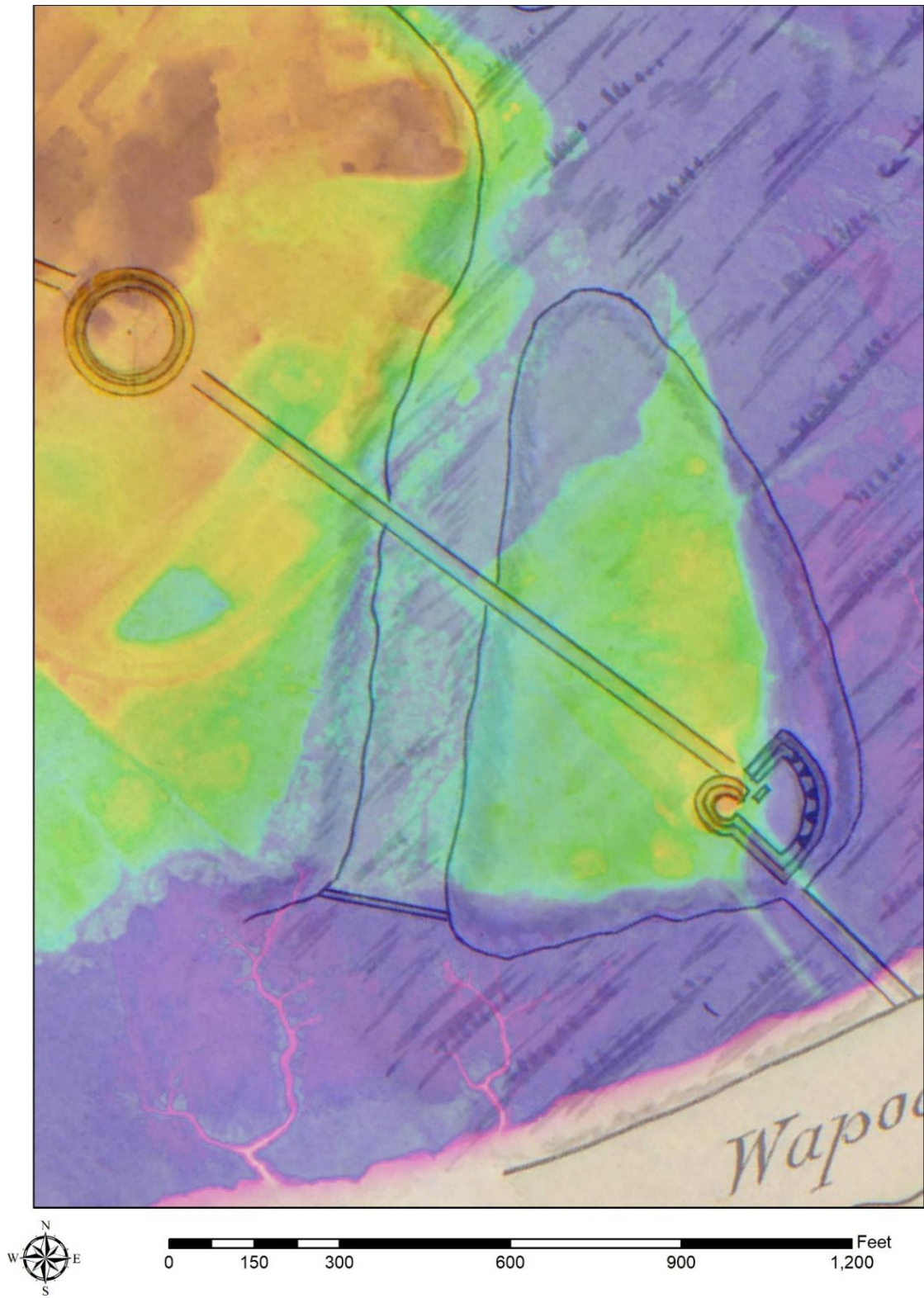
The George Taylor Map, 1781, Georeferenced with the East Bay Curtain Wall
and Craven's Bastion



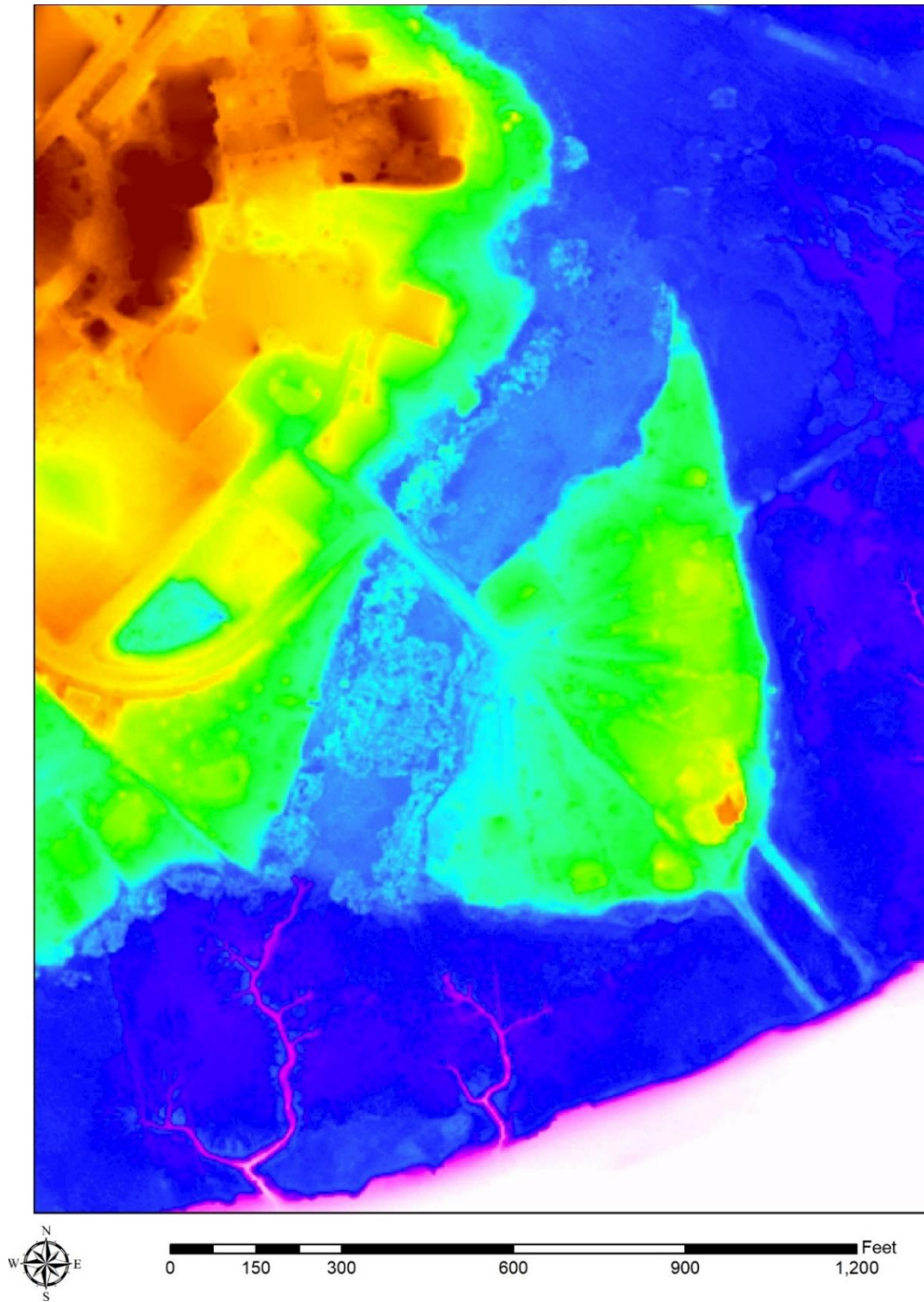
George Taylor Map 1781 Georeferenced with Fenwick's Point and a Modern Aerial Photograph



The George Taylor Map, 1781, Georeferenced with LiDAR Scan



Fenwick's Point as seen on LiDAR Scan



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